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THE ECONOMY OF THE CHINESE ARMY.*

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The numerous fortified cities and towns met with throughout China, and the Great Wall itself, must be regarded as sufficient evidences of the necessity the Chinese have had for a military organization to sustain the Government of their country, and their written history informs us that they not only had to defend themselves from external enemies, but that their continent being divided into several independent states, they were continually at war with each other, and that when they became a united nation, they extended their empire far beyond its proper geographical limits by their military prowess, so that we find its sway at one time extended from the Caspian Sea to the Straits of Sagallien, and reached as far south as almost to touch the Indian Ocean.

It will give some idea of the extent of the Chinese Army in the sixteenth century, if we refer to Mendoza, who enumerates the quota of horse and foot for which each province was accountable, at that period. He says, "the Province of To Lan Chia, which is that which "bordereth on the Tartarians, with whom the Kings of China have "had wars (as aforesaid), hath two millions and eight hundred "thousand footmen, and two hundred and ninety thousand horsemen, "and are the most famous and best in all the whole Kingdom, for that "they are brought up in the use of armour from their youth, and "many times exercised the same in times past, when they had their "ordinary war with their borderers the Tartarians." He then sums up the whole as follows: "By this account, it plainly appeareth that

* The illustrations to this Lecture are graphotyped from sketches by the author. —Ed.

"all these provinces (which may better be called kingdoms, consider-
"ing their greatness) have five millions eight hundred and forty-
"six thousand five hundred footmen, and nine hundred and forty-
"eight thousand three hundred and fifty horsemen. All the which, if
"in valour and valientness might be equalled unto our nations in
"Europe, they were sufficient to conquer the whole world." Du Halde is more moderate, he says: that in the seventeenth century, "they "reckon more than eighteen thousand mandarins of war, and above "seven hundred thousand soldiers distributed among the forts, cities, "and fortifications belonging to the several provinces, and along the "Great Wall." And what is the present condition of this great nation, who counted their armies by thousands, while we were hunting the wild beasts of the forest for our subsistence, and were on a level with savages? A few years have hardly elapsed since a mere handful of men from our island home landed on the shores of that distant continent, marched to their capital, made the Emperor of three hundred millions of people fly from his palaces, and submit to terms of peace; on all sides civil wars are desolating the land, the aid of foreigners has been sought to suppress revolt, and the nations whom they affected to despise, have been entreated to take in hand their army, whose uselessness they acknowledge, and teach them the art and science of war.

Our wars with China up to the culminating one of 1860, had taught us to treat the Chinese, as an enemy, with contempt, not so much from the deficiency of pluck in the individual Chinaman as a soldier, as from the want of military appliances and science, to which, numbers however individually constituted, must succumb; for instance, even in the earliest wars with the Chinese, our appliances of the period, were as much superior to theirs, as our present appliances are superior to our own of that particular time, in other words our muskets and artillery were as much superior to the matchlock and rusty old cannon of the Chinese, as our present breech-loading rifle and rifled cannon are superior to the old flint musket and smooth bore carronade of former days. It was curious to remark, that while the equipment and organization of their army apparently remained stationary, each war found their defensive fortifications better planned, and placed in more commanding positions than in the preceding ones; for instance, the flanking defensive forts on the high ground on the north side of Canton, which our military commanders did not disdain to garrison, and the Taku Forts, both which would probably have withstood the attack, if the Chinese had not been over-matched in artillery, and in arms of precision. It was this aptitude for defensive warfare that produced the Great Wall, which answered the purpose it was intended for, namely, to keep the Mongolians from making incursions into China, and to save the expense of maintaining a standing army along the extended frontier. So likewise the defensive walls surrounding their cities, those marvellous memorials of their skill in masonry, no doubt answered the object they were intended for, also, namely, to make their cities and towns serve as places of refuge, to which the people could resort during the incursions of the bordering states, or to preserve the civil

magistrates and Government in political disturbances of the nature of civil war, &c. A glance at the map of China shows how numerous these walled cities and towns are throughout each province.

The plans of construction of the defensive walls of their cities have a remarkable resemblance to each other. The ground plan is generally a square or a paralellogram in form, each side wall being perfectly straight and facing a cardinal point. This form holds good more especially in the north of China, but in the southern and middle provinces there are many cities we are familiar with, where the outline of the ground plan is very irregular. These walls are generally about thirty feet in height, and have an inclination of about ten degrees inwards as they ascend. They are for the most part built of bricks of rather large dimensions, for instance; those forming the wall of Pekin, were eighteen inches in length, nine inches wide, and four and a half thick. Those in the wall at Shanghai were fourteen inches long, seven inches wide, and three inches thick. The top of the wall is crenelated, and is sufficiently raised to form a breastwork, above the banquette formed in the inside, by the earth dug out in making the circumvallating ditch in front of the wall, and distant from it about 20 to 30 feet (Figs. 1, 2). The ditch is about 40 feet wide, and deep enough to form a canal on which there is often considerable traffic, if the locality admits of much water communication; but in most of the cities I visited in the north of China, the ditch surrounding them had no water in it, or was filled up with sand, or as in the Tien Tsin ditch, was made the cloaca maxima of the city, and was filled with its filth. In measuring the city wall of Shanghai, I found the width of each embrasure at the top of the wall to be twenty-two inches, and the distance between the embrasures about eight feet; in this part there were small square apertures about eight inches wide, for use as spy-holes, or embrasures for jingals and matchlocks. The large embrasures being open at the top, would imply that they were intended for bowmen, to enable them to put the bow in such a position as to hit objects close to the wall below.

Guns are generally mounted before embrasures over the city gates, or on the projecting bastions or flanking defences, a suitable platform being raised to the level of the ordinary embrasure. The walls of their cities vary in length from a few hundred yards to several miles on each side; and where flanking defences are not constructed at the distance of every eighty yards, their outline is uninterrupted throughout, unless at the centre, where the gate is usually found.

The "Ta Tsing gīh tung che" gives the following measurements of the cities of Peking, but only gives the whole circumference, not the length of the sides:

Chinese City	40 le in circumference.
Tartar City	18 „ and odd „

The Chinese city is described as being 28 le long, and the original plans as being 70 and odd le in circumference. The Tartar city is nearly square. The Chinese city is considerably broader than what we should call its length. The above 28 le refers to what we should call the breadth, that is from east to west—a le is

equal to one-third of a mile. The wall of Pekin has masonry on the inner as well as the outer face of it.

The city gates are defensive works in themselves, and are apparently more capable of resisting attack than the wall itself, as if this was the only point an enemy could think of attacking. They are generally semicircular in outline, and made of the same material as the wall. The entrance is by an archway formed in the angle where the structure springs from the wall. There are two gateways, one an inside, and the other an outside one. In a city in the north of China, I observed three gateways, before passing the inner gate. These gates are made of stout wood, faced externally with thin sheet iron and nails with large heads. They open in the centre, and are fastened by a bar behind (Figs. 3, 4).

Over these gateways there are buildings of such a height as to command a good view of the city and surrounding country. They are intended for guard-rooms, and usually consist of an upper and lower story; though those over the gates of Pekin were substantial brick buildings of four or five storeys, and were capable of accommodating several hundred men in each. Generally speaking, there is a smaller guard-room situated below, either within the gate enclosure or immediately in front of it, on the inside, where a petty mandarin has charge of a few soldiers, who lounge about the gate, unarmed though in uniform. They take cognizance of the people passing in and out. Their duties are more of the nature of police, and they support themselves to a large extent by their extortions on the poor people bringing their garden or other produce into the city for sale. When visiting the city of Suchow, I noticed that the front face of the wall of the city near the top of it, below the embrasures, was thickly studded with re-curved hooks, standing out about two inches from the surface, and resembling stout nails. They were no doubt intended rather to prevent the garrison escaping than for defence.

The Chinese have some curious superstitions connected with their city walls; for instance, when Brigadier-General Sir C. Stavely broke a way through the city wall of Tien Tsin, the Chinese governor made an urgent request to be allowed to build up the wall, saying, "That the god of destructive fire would be sure to enter the city, and that it would be burnt in consequence." A new gate cannot be opened in a city without the special permission of the Emperor.

On examining the plan of structure of the walls, one might suppose that they would not stand any time when exposed to our breeching ordnance; but experience has shown that they are capable of a good deal of resistance, owing to the mass of clay with which they are backed. Frequent opportunities have been afforded for testing them, in the various expeditions against the rebel Taepings, in which English and French artillery were engaged.

Against the artillery in use in former days these walls could stand without much difficulty. When we examine what these weapons were, we can readily imagine this. On looking over old Chinese books, giving a description of their ancient battles (by which they appear to have been familiar with escalading ladders), the form of the cannon (Fig. 5) appears very different from that of those now in use. It is curious to

notice that some of the original forms were breech-loaders (Fig. 6). A few of these were found after the capture of Tien Tsin. They were made of wrought iron, though heavy enough to require two or three men to lift one of them. The plan of their construction was so contrived, that the ball could be introduced at the breech, and the charge of powder placed in a movable chamber, made of wrought iron of sufficient strength to withstand the explosive force. This was let into a chamber at the breech behind the ball, and fired through a touch-hole, as in the ordinary way. The rude fitting of the powder chamber, which also closed the breech, showed that there must have been a great waste of powder, although it probably insured rapidity of fire. They were evidently used as swivel guns, and were chiefly intended for on board ship. As this form of breech-loading cannon was known in Europe in the early part of the sixteenth century, it is probable that it was introduced into China by the Portuguese. The form shown in Fig. 5 is probably the most original of all forms of cannon. I observed many of them among old arms in the city of Tinghai, at Chusan. They were about three feet in length, made of wrought iron, and strengthened by rings. Several old cast-iron guns are usually seen on every city wall, resembling the form hitherto familiar in Europe, and they were no doubt derived from European patterns. The date of these guns are always to be seen recorded in raised Chinese characters, made in the casting, showing the year of the reigning Emperor, and the place where they were cast.

Some very fine brass guns, of great length and calibre, were found at the Taku and Tien Tsin forts after their capture, showing great skill in casting such large pieces of ordnance. In the engagements against the rebels, near Shanghai, all descriptions of modern ordnance were used; and the governor of the province, Lee Fu tai, seeing the value of this arm of the service in warfare, has a well-equipped force of modern artillery, officered by Europeans, and maintains a laboratory for manufacturing shot and shell, percussion caps, &c., in which the newest appliances of steam machinery are employed, under the superintendence of Dr. McCartney, formerly an assistant-surgeon in the 99th Regiment. This laboratory was till lately in the city of Suchow, but now occupies some old buildings at Nankin, at the place where formerly stood the famous porcelain tower. Lee Futai gave permission for the materials of this tower to be employed in building the new laboratory.

On the capture of Pekin, several beautiful models of guns mounted on gun-carriages, perfect gems of art, were found in the Summer Palace. Still they never served to induce the Chinese to adapt them to any extent to a practical use. These models were either made from European designs, or may have been sent as presents from European states to the Emperors. A Japanese work on China, shows that the form of the mortar was familiar to them, though none were found in the forts captured by us. Lieutenant Kane, R.A., while instructing the Chinese at Tien Tsin in gunnery, constructed a couple of carriages for field service, and mounted them with brass guns. Chinese ponies were used instead of horses, and they appeared to answer very well, when there were enough of them attached to each gun, and the Chinese

gunners showed sufficient expertness in going through their exercise; but it is very questionable whether the Chinese Central Government will profit by what they have been taught, or will make an Artillery Branch of the army, like that in the armies of European states. Very few guns mounted as field artillery were met with in the campaign in North China in 1860, and those found were exceedingly rudely mounted.

In a Japanese index of yearly occurrences of note, it is recorded for the year 1860 as follows:—"The Chinese empire transferred to the "Russians 2,700 le, = to 900 miles, on the north side of the Black "Dragon River, in exchange for great guns." It is supposed that some of the guns which fortified the Taku forts were derived from this source.

Du Halde says: "Artillery is but a modern invention among the "Chinese; and though that of gunpowder is very ancient, they have "seldom made use of it but for fireworks, wherein they excel. There "are, however, three or four bombards, short and thick, at the gates "of Nankin, ancient enough to prove that they had some knowledge "of cannon, though they seemed to be ignorant of their use, for they "serve for nothing but to be shown as curiosities. They had also a few "patarreroes on board their vessels, but had not skill enough to make use "of them." "In the year 1621, the city Macao having presented the "Emperor with three cannon, and men to manage them, the first trial "was made before the mandarins, who were greatly surprised at the "novelty, but more when they saw that one of the pieces, in recoiling, "killed a Portuguese and three Chinese, who did not get out of the way "time enough. These guns being employed against the Tartars, who "came in swarms towards the Great Wall, they were so terrified by the "havoc made by them, that they fled, and durst never approach it any "more." He further tells us, that in the year 1636, the Tartars made another eruption against China, and alarmed the Government so much that they requested one of the missionaries of the Jesuits, named P. Adam Schaal, to cast some guns for them, but he transferred the matter to another missionary, named P. Ferdinand Verbiest, who was acquainted with the art of casting metal, and the result was that 130 pieces of cannon were cast. Subsequently he got an order to cast 320 cannon, which he completed in about a year, and so greatly pleased the Emperor, who appears to have taken a great interest in the trial of these guns, that great honour was done him at court, and the missionaries gained much favour and support.

In ordinary times of peace the military occupy the guard rooms over the gates of the cities, and in time of war, they occupy the public buildings to some extent, or the soldiers are encamped along the top of the wall, or in the open unoccupied spaces, always found within the walls. Within the cities there are no regular barrack buildings as with us, the only instances of such that I found in China, were outside the Anting Gate at Pekin, and in the military cantonment of She ling, in the western part of the province of Chili (Figs. 7, 8). These barracks consisted of a series of ranges of one story houses, large enough to accommodate ten persons in each. There was a small enclosure in front of each room. The rooms were, as nearly as I could estimate, 18 feet in width and 21 feet long, and 15 feet high,

and at the end opposite the door there was a kang or raised platform, on which the men slept as on a guard bed. A flue from a fire-place in front, led in a tortuous manner through the kang to a chimney which opened at the roof, near its lower margin, and not at the apex, as with us. The fire-place was made available for cooking purposes, a cast-iron pan, about 22 inches in diameter being inserted on the top of the fire-place, while the fire was fed through an aperture below. The space between the ranges of buildings was wide enough to permit the men to parade in line, and march through in the formation of four deep. I did not enter the rooms at She ling, but did so at a barrack building near the Anting Gate north of Pekin, which was not enclosed by a high wall as at She ling; in the latter place, at the time of my visit, these rooms were occupied by a number of Tartar women and their children, the families of the soldiers who were absent at Jehol. The entrance doors of other rooms were built up by masonry. The mechanical skill displayed in the wood work, and fittings, could not be surpassed by our workmen, and the masonry was of the best possible description. A large building opposite the south entrance was occupied by the commissioned officers, and the sub-officers occupied the central rooms in the ranges behind. The barracks and passages appeared to be kept perfectly clean. There was not the slightest smell of a disagreeable nature about the place—and a good drain made of cut stone formed a channel for the rainfall from the roofs of the houses, to be carried off. This drain ran along the ground close to the wall, which formed the back of the rooms. There were no windows in this the northern wall, as there never are in houses throughout China. The windows and doors faced the south, and admitted sufficient light to make them cheerful. The ranges being of one story and sufficiently apart from each other, did not interfere with light or ventilation, and they were not exposed to severe blasts in cold weather.

When on the march, a regiment of Chinese soldiers does not entrench itself at every halting place, but when in the vicinity of an enemy they lose no opportunity of doing so, and it is worth recording with what extraordinary rapidity this is done. Immediately on the ground being selected by the commandant, all hands set to work with spades and picks, and make a breastwork and ditch in a few hours, then collecting a quantity of stakes, sharpened to a point at both ends, made from bamboos or stout branches of trees whichever is afforded by the locality in greatest abundance, they plant the ground thickly all round the intrenchment about knee high, for a distance of about 10 yards wide. They also sometimes adopt the plan of felling trees if near them, and covering the ground in front, the stems being towards the stockade—other contrivances are also used, for instance, numerous holes about 2 feet deep and 1½ feet wide are dug close together, and at the bottom of these holes, sharp stakes of bamboo are stuck, so that a bare footed person stepping into one of these holes would be disabled at once, or even a person with shoes would suffer.

The appearance of a Chinese encampment, when seen at a distance, has a remarkably gay effect, owing to the number of gaudy coloured

banners seen fluttering over it, reminding us somewhat of the passage in Marmion, descriptive of the camp—

> Nor marked they less, where in the air
> A thousand streamers flaunted fair;
> Various in shape, device, and hue,
> Green, sanguine, purple, red, and blue,
> Broad, narrow, swallow-tail'd and square,
> Scroll, pennon, pensil, bandrol, there
> O'er the pavilions flew.

The encampment is composed of a series of entrenchments, each entrenchment being occupied by a separate regiment, distinguished by a flag or banner of an uniform colour and pattern of its own, and distributed in the proportion of one banner to every ten men. The regiments are generally small and number, on an average, about five hundred men each. An entrenchment for a regiment of this strength would occupy ground measuring 100 paces by 50. Its outline is generally a parallelogram in form, and consists of a breastwork, formed by the earth dug out in making the surrounding ditch. This ditch is sufficiently wide and deep to keep the men from breaking out of camp rather than for defence. Near the top of the fence there are apertures by way of embrasures or loop-holes for jingals or matchlocks to be fired through, and generally, at the angles, there are flanking defences. There is but one entrance, which is closed by a folding gate, and barred on the inside (Fig. 9).

The tents, as regards the two central lines, are usually found in regular rows, and about 9 feet equidistant from each other, but in other respects they are placed only as regularly as the formation of the ground and the number of tents occupying it permit. A wide pathway, dividing the centre lines of tents, leads straight from the gate to the tent of the commandant, who is usually a blue-buttoned mandarin, and is subordinate to a higher mandarin, having a red button, and corresponding to a General of Division.

I took the following dimensions of a Chinese tent in an encampment some distance from Shanghai. Its area was 15 feet by 15 feet, it was 7 feet in height, and nominally accommodated ten men with a sub-officer, who was in charge of it, and the men who occupied it. It was made of thick cotton cloth of foreign manufacture, known as American drill, about a yard in width, and where the pieces were joined together a stoutish rope was sewn up with it to keep the strain off the cloth and to add strength to the material; this rope was also connected with one running along the lower margin of the tent and formed the guy rope by which it was fastened to a stake driven into the ground. This material was not very lasting, nor did it give much protection against sun, rain, or cold, so that pieces of older tents had to be thrown over it, consequently the encampment had a very patched dingy appearance. The tent was supported by a horizontal bar of wood, resting on three upright poles of bamboo, having a projecting iron spike which fitted into a corresponding hole in the horizontal bar, and where one of the upright poles was not long enough it was raised by a layer or two of bricks or stones. To make the tent

more comfortable and to protect themselves from the wind, the men raised a course or two of bricks 1½ feet high all round, excepting at the entrance (Fig. 10).

The appearance of the interior of one of these tents was as follows:—a number of thickly quilted rezies, corresponding to the number of men who occupied the tent, were spread upon the floor over a layer of straw, or old mats, or reeds, the men slept enveloped in these rezies. Some loose clothes and accoutrements lay in an untidy manner on each bed or rezie. There was a teapot on the floor and a few empty bowls with chopsticks, and a pair of Chinese shoes, put out to dry with their soles uppermost, also some billets of wood used for fuel. The ground was not swept, so that it appeared very untidy and dirty. The arms, smooth-bore percussion muskets of English manufacture, were tied up in a bundle alongside the middle upright pole, with common string. Each tent had its own cooking place, consisting of two cast-iron pans, about 22 inches in diameter, set up on a hearth, built up of bricks and mud (Fig. 11). These cast-iron pans are made in immense quantities in China, being of universal use throughout the country, their price varies from sixpence to a shilling of our money. It was not uncommon to find two sets of these cooking places joined together and a common flue constructed between them, and covered in by old mats spread on a few wattles, or they would be simply placed over a groove, scraped out of the ground, to serve for a hearth (Fig. 12). This is commonly done on the march or in the field. A number of drains were constructed through the tents to carry off the rain to two larger drains, one of which ran along each side of the centre pathway to the ditch outside; these drains were half filled with filthy water, and no doubt made the entrenchment in a bad sanitary condition. The latrine arrangement was also very defective, it was placed in a projection from one of the sides of the entrenchment, another had it at one of the angles, and were it not that the accumulation was frequently removed by the local farmers, for agricultural purposes, its condition also would have been very bad. In the camp near the south gate of the city of Shanghai from which the ground plan of an entrenchment (Fig. 9), was taken, there was no latrine arrangement whatever, consequently the immediate vicinity, although surrounding the residence of the Fu-Tai, the chief magistrate of the province, was in a horribly filthy state. In this entrenchment, being liable to be attacked by the Taeping rebels, the angles were so constructed as to form flanking defences; a pathway extended all round the inside of the entrenchment, where the men on guard during the night made their circuit, at the same time beating a hollow cylinder made of the joint of a large sized bamboo having a long slit on one side, so as to increase the sound when struck by a short stick (Fig. 13); it was worn suspended from the neck by a string, and at certain periods of the watch was made to resound through the camp in monotonous time. If struck slowly it signified that "all was well," but if it was struck rapidly it implied an alarm, and by modulating the sounds one watchman could make intelligible signs to another, while a considerable distance apart.

In nearly all the fortified places captured in the north of China in 1860, a curious mode of hutment (Fig. 14) was noticed of rather a novel and ingenious kind. These huts were very numerous in Tung Koo, and were found in the Taku Forts to be the only barrack accommodation for the garrison. The mode of their construction was very simple. A framework of wood of sufficient height (8 feet) and stoutness, supported two horizontal pieces of timber corresponding in length to that of the structure, about 20 feet, over these were placed, so as to form the sides and arched roof, a series of long bundles of the reed *Arundo Sinensis*, found growing so universally in China. These reeds are about half an inch thick at the base, they are about 8 or 9 feet in length, and though hollow, are very strong and cane-like. Each bundle was about 5 inches in width, and tied together by some common jute fibre growing in the country, and joined together so as to be made sufficiently long to reach from the ground on one side, to be carried over the platform or frame work to, and reach the ground on the other side, both extremities being buried in the earth. Next to this a similar bundle was laid, and joined so as to prevent displacement by numerous stakes of wood run through to serve as pins, till the whole structure was completely covered as to its sides and roof. It was then plastered with wet clay, and the ends were closed by a kind of wattle and dab partition, leaving a space for a door and window at one end and a window in the opposite end to serve for ventilation in the very hot weather. Each hut could allow of twenty men sleeping inside, being about 12 feet wide. These huts were arranged in regular rows side by side, with a narrow space between them, most of them were without kangs, as they were not intended to be occupied during the winter season, when the ice was a sufficient protection to the place. They were in a measure suitable to the climate, as they afforded good protection against the sun, and the little rain which falls in the year, could not do much damage to them. They could be constructed with great expedition, and the materials were abundant, while timber and deal boarding was exceedingly expensive if not unprocurable.

By a fundamental law of the Chinese Empire every man is liable to serve the State, either as a soldier or as a labourer in the public works of the country, such as canal-making, &c. There are, however, exemptions to this law. For instance, those who have taken certain literary degrees, or who are already in public employ; and it is in the power of all to exonerate themselves by paying what is called an exemption tax, which is one of the most considerable sources of revenue the Government have. There is never any necessity for claiming an individual on the plea of this law, as the labouring class of the population is so numerous that there is no difficulty in getting men to recruit voluntarily. A notice posted up at the gates of the city stating that men are wanted, is sufficient to procure any number of recruits from the labouring or coolie class, especially if the necessity which requires an increase of the army be the occasion of interfering with the means of livelihood of such persons. Chinamen being in the habit of associating in large numbers in the tea houses of the towns and cities, where they discuss the events of the period over a cup of tea instead of a pint of beer or

a glass of grog, calculate their chances of loot and the circumstances of the service for which men are required, and if they see that they have a favourable prospect open to them in the army in the way of punctuality in their pay and subsistence, and a chance of employment failing them in civil life, they enrol themselves in a corps, by entering their names, age, place of birth, in the roll of the corps they enlist in, and receive in return a small tablet of wood, called a *you pai*, about half an inch thick, three inches wide, and four inches long, on which the name, age, place of birth, corps to which belonging, and the date of enlistment are written. Recruits have to undergo no medical examination to ascertain their fitness or otherwise, and are approved of by their general appearance, just as we should select a coolie out of the streets if we wanted to employ one. They know what is required of them, and that if they are not capable of performing their work through physical disability, they will be simply dismissed.

In time of peace there can be no difficulty in getting men to fill up a vacancy in a city guard, or in the limited ranks kept on service, though the wretched appearance of such soldiers must, one would think, make employment at any other pursuit far more preferable. The opportunities for peculation and extortion on people of the lowest class of the population are the great motives for entering the service, whether to be employed at the gates of the cities or at the numerous barriers posted all over the country on the roads or canals, for the purpose of collecting revenue or tolls, at places which require a small guard of soldiers to enforce the orders of the mandarins.

Du Halde says: "As the military business does not take up much "of their time in a country which has been so many years at peace, "far from being obliged to enlist men by force or money, as is prac- "tised in Europe, the profession of a soldier is commonly looked upon as "a fortune, which they endeavour to procure by means of their friends, "or by presents to the mandarins, the service being generally in the "country where they dwell and have their family."

Men who have committed civil offences, such as that of forgery, are sent to the remote frontiers to form the guards there located. The provincial armies are maintained and equipped by subordinate mandarins, Taou-Tais, or governors of districts, each district having a certain proportion allotted to it. Some corps supported by the district governors may consist of strangers to the province, and it is only under great emergency that corps forming part of an army of one province can enter another. The Commandants and Generals of divisions are all appointed by the Governor-General, and great care and judgment are required in making these appointments, one principle being observed, that each Commander be sufficiently antagonistic to another in interests, by rivalry, or petty jealousies, so that there need be no apprehension of their acting seditiously in concert with each other. For the same reason large bodies of men are kept apart as much as possible, for fear that if they raised a general mutiny there would be no means of suppressing it; but mutinies are not unfrequent, owing to mandarin dishonesty, involving arrears of pay, and of supplies for the subsistence of the men.

In the vicinity of Pekin, large bodies of Manchu and Mongol troops are maintained for the immediate defence of the Emperor. At Canton, a quarter of the city within the walls was garrisoned by the descendants of Tartar troops, who were stationed there as a garrison to keep in check the local military; and at Nankin there was a similar military colony established, till the capture of the city, when they were annihilated by the Taiping rebels.

The pay of a coolie or labourer is about two hundred and fifty or sixty cash per diem, which, at the exchange of one thousand cash for a dollar, is equal to twelve pence halfpenny or thirteen pence of our money. The pay of coolies employed by our Government in China is eight dollars a month; and a soldier in those corps which were raised for instruction in drill, got eight dollars a month and clothing. Those belonging to corps of local militia at the camp of instruction, got similar pay to men serving in their army in general, which was five dollars a month, an allowance of rice and fuel, and two suits of clothing a year, consisting of turban, jacket, and trowsers. They were to provide their own necessaries—boots, socks, bedding, cooking utensils, &c.

Du Halde says: "The three northern provinces furnish abundance "of soldiers, who, every month, receive their pay, being five sous of "fine silver, and a measure (1¼ lb.) of rice per diem, which is suffi- "cient to maintain a man. Some have double pay, and horsemen have "five sous more, with two measures of small beans to feed their horses, "which also are provided by the Emperor."

In the matter of paying the troops there is a vast amount of squeezing. The Commandant has the payment of his own men, and superintends this, while his writer, who keeps the account, checks the roll, tries by every device to make a profit on the transaction in his own favour, there being every facility for doing so, especially by giving inferior cash, &c. While passing through the barrack at She ling, in North China, I noticed some soldiers drawing their pay from the paymaster's office, which was situated in a small building near the south entrance, in front of the Commandant's house. A window of the office opened into the enclosure, and as each man came up he presented his *you pai*, or tablet, and on referring to the register where his name was entered, the amount was paid to him, and he walked off.

The proverbial squeezing propensities of the mandarins caused Brigadier-General Sir C. Stavely, K.C.B., to make a stipulation with the Chinese Government when requesting that their soldiers might be drilled according to our method, by English Officers, that the Officer in charge of each corps should see his men paid regularly. While this stipulation was very necessary to prevent desertion, it was also most advantageous to us in gaining the confidence of the men.

The food of the labouring class of the Chinese varies somewhat in the different provinces. The scarceness of rice in the further north makes it too dear for any but the richer classes to use it as a common ingredient of their food, and instead of it, wheaten flour and its preparations are made a substitute. Its place is also supplied to a great

extent by a preparation made from the bean of a species of *dolichos*, called bean curd, or tow foo, resembling cream cheese in consistence, and no doubt containing a great deal of concentrated nutriment, but it is quite unsuited to our stomachs. This condiment is also used to some extent in the central provinces; arrowroot, made from the roots of the nelumbium, and yams are also used largely as food. The more northern people use much more animal food, such as beef and mutton, than they do in the south, and do not disdain horse or camel flesh, and all use either sea or fresh water fish, recently caught or dried, whenever they have the opportunity of obtaining a supply. Of the numerous varieties of vegetables grown in the country, a species of borassus, or cabbage, called by us white cabbage, is universally used. The more southern people use very little animal meat, which generally consists of pork, some oleaginous matter being an essential ingredient in rice food. The labourers' food consists of rice, cabbage, salt fish, and oil or pork fat, and will cost as follows :—

Rice, 1lb.	50 cash	1000 = 1 dollar.
Cabbage, 1¼ lb.	45 ,,	
Salt fish, ⅛ lb.	15 ,,	
Pork fat or oil, ⅛ lb.	10 ,,	
	120	

If he procures his meals in a cooking shop, he will pay as follows :—

Breakfast ..	1 bowl of rice..	16 cash.
	1 bowl of cabbage and oil	14 ,,
Mid-day meal	2 bowls of rice	32 ,,
	1 bowl of cabbage and oil	14 ,,
Evening meal	1 bowl rice	16 ,,
	1 bowl cabbage and oil	14 ,,
		106

A measure of rice, equal 1⅓ lb., is the quantity allowed as a day's ration per man, to soldiers.

The large body of Chinese coolies employed by the expeditionary army were allowed 2 lbs. of rice per man per diem, during the time they were employed, and Colonel Gordon's force of Chinese were allowed the following scale per man per diem :—Rice, 2 lbs.; salt pork, ¾ lb., or 2 lb. of salt fish, besides vegetables and oil. (See Blackwood, Feb., 1867.) The hard labour scale fixed by the joint foreign and Chinese Commissions at Shanghai, allowed the prisoners the following scale :—"Prisoners shall be allowed three meals a day—

Morning,	4 taels of rice,	1 tael of vegetables.
Noon,	8 taels of rice,	2 taels ,,
Evening,	4 taels of rice,	1 tael ,,

or about 1¼ lb. of solid food per diem, 2 taels of fish or meat being added every second day."

Rice varies considerably in quality. That which is grown in China, owing to its careful cultivation, has considerably greater nutritive and hunger-satisfying properties than the rice imported from the Straits, or other countries; the latter is so poor (although as fine a looking grain), that three bowls of it barely satisfy a man's appetite in the same manner that one bowl of native-grown rice would do.

The Japanese have a still more nutritious rice than the Chinese, who say they do not like it, owing to its extreme richness. It is strange that rice is not liked by the European soldier, who fancies it produces worms, and Europeans in general in China use very little of it, and that only in curries or rice puddings in a small degree. Rice and more solid animal food are apparently incompatible. It is eaten with curried meats, apparently to moderate the pungent properties of the spices used in their preparation.

In the further north they substitute for rice a preparation of wheat flour, called pie-mien. It is made by kneading dough for a long time, till it acquires a considerable tenacity, and then drawing it out into thin shreds; and by cutting it into thin slices while rolled up into cylinders, after it is pressed into a thin layer. These slices are then drawn out to any amount of fineness. Every separate operation in this process requires great expertness in the cook. These vermicelli-like shreds are cut into short bits about half an inch in length, cooked with oil and hot water, and eaten with the assistance of chopsticks. Bread made of wheat flour is very commonly used; it is unleavened, and the cakes resemble the chopatties of India. It is not met with where rice is the common food of the people.

The Chinese are proverbial for eating as often as they can, and as much as their means will allow them; but the Chinese soldier, when campaigning, limits himself to two meals a day, one at 8 o'clock, A.M., and the other at 4 o'clock, P.M., and this is submitted to mainly from the fact of his supply of fuel being in as limited a scale as his food. Eating houses and tea shops are found in every town and village in the country, and the soldiers when quartered near such places, always make use of them to procure their food, when they do not draw rations.

Fuel (which is of equal importance to an army in the field as food) is often very difficult to be obtained, there being little or no timber. Wood cut up into billets is the most portable form of fuel, and easiest issued, and saves the country people from being pillaged, or even their houses pulled down, to get at the rafters and beams, which I have seen done when campaigning in China. A ration of fuel is very wisely included along with the ration of rice. The fuel is always kept in the men's tents for security. The daily allowance is about 3 lb. of wood per man.

The clothing of a Chinaman varies with the season of the year, and with the latitude in which he lives. The winter of the further north being extremely cold, he is obliged to wear fur coats and sheepskins, to keep his body warm; and the summer being excessively hot, he

is often in a state of semi-nudity. In the more central parts, the extremes of climate being less marked, furs are dispensed with, and clothing is worn all the summer. The further south being of a more equable temperature, a more equable mode of clothing is there used, or rather less warm clothing is required in winter.

There is one characteristic of a Chinese with regard to his clothing, that is, that he is continually adapting it to every change of weather, and that even in the course of a day, he will vary the amount of clothing with every change of temperature that may occur. The loose make of his dress permits him to do this with much facility, by putting on additional jackets, or by taking them off. Five consecutive jackets, overlaying each other, have been often seen on a Chinaman. The dress of a Chinaman of the labouring class is mostly made of cotton, and restricted to a peculiar cut, imposed by state laws as a badge of his submission to Tartar rule. If it is for wear during the hot weather, it is made of a single layer of cotton cloth; if for colder weather, the coat or the trousers are made of a double layer, and padded with cotton. The clothes worn by civilians, are still retained while they serve as soldiers: a loose jacket of a peculiar form and colour, and having a large circular patch of about 10 inches in diameter in the front of the breast, on which the name of the corps is written in large Chinese characters, constitutes the uniform of Chinese soldiers of the old school. Some of the Tartar cavalry soldiers, against whom we fought in North China, had a jacket of very poor cotton cloth of a yellow colour, on which was written, on a space covering the breast and back, in very rough character, with a common brush dipped in Indian ink, the name of the corps to which the man belonged, and this jacket was worn over the ordinary labourer's clothes, and constituted his uniform.

The military jacket of the troops composing the army of Lee Futai, the governor of the province of Kiang-soo, was made of camlet, of a dark purple colour, and having a margin corresponding to facings, of yellow, about two inches wide round the cuffs, collar, lower margin of skirt, and at the union of the lapels. The trousers were made of common black cotton cloth, commonly worn by labourers, but of a uniform pattern and loose make.

Other troops, instead of camlet, had their jackets made of cotton cloth, dyed of different, but for the most part of dark, colours. On those jackets there was no collar; the edge of the jacket came close to the neck, but did not choke it. It hung loosely over the upper part of the body, and reached a little below the waist. The sleeves were loose all the way to the wrist, and were broad enough to allow the hands of the opposite sides to pass freely up them. The turban was exclusively used by the troops serving against the Taeping rebels. This form of head-dress suits the Chinese head remarkably well: blue, red, and black being the colours most generally used (Fig. 15). In the further north of China the soldiers wore a stiff hat of a peculiar shape. The part covering the head was round, and fitted it closely; the margin or brim was turned up all round; in width it was about three or four inches. The common Chinese felt hat, of a soft pliant texture, and black in colour, was frequently worn by the levies, especially by the horsemen.

High cloth boots are in common wear, and more generally shoes made of cotton cloth, and the soles of felt, or sandals of plaited straw were worn, but frequently the men went bare-footed, their legs being protected by long loose stockings or leggings, or if bare-footed, with bandages of common black cloth round their shins from below the knees to the ankles. This form of gaiter was very applicable to the country. A commandant of a corps who were thus equipped, on being asked where were the shoes and stockings of his men, replied that in going through paddy-fields, shoes were useless. The men made better way with bare feet; and in going along the narrow pathways, projecting brambles, or the sharp edge of the grass itself, were prevented doing any injury to the shins, a very vulnerable part of a man's body, by the bandages he wore as greaves.

Common China cloth shoes were usually worn, and when wet weather prevailed, leather varnished boots, with projecting nails to prevent slipping in the mud, were very frequently seen. It is curious how well a Chinese soldier adapts his clothes to every circumstance of climate or weather, apparently without general, divisional, or regimental orders to do so. Nor is he prevented using an umbrella if the weather be wet, or hot enough to require it. It may also form a part of his necessaries, as much as his mud-boots, or his fan.

A commissariat department, in the sense we mean, does not exist in the Chinese army. The district governors being responsible for the equipment and maintenance of a certain number of men, supply all their wants through the commandants of corps, who keeps account by his writer, and draws on the local governor for supplies, and sees them issued. The governor obtains these supplies from men engaged in that particular branch of business, and has them delivered at the camp by agreement or otherwise, as he sees it most advantageous to him. The law of agreement or contract is recognised by the Chinese, who are sufficiently business-like in their habits to be punctual in fulfilling the terms of an agreement.

Colonel Gordon organized a commissariat department in his force, composed of European officers, whose integrity could be more depended on than that of the Chinese. There was a mandarin of high rank attached to his force, who nominally had a joint command. A requisition on this mandarin, who served in some degree in the capacity of political agent, also procured food, fuel, clothing, or war material from the Taou Tai, or governor of the district.

Human life being generally esteemed of little value by the Chinese, and a soldier's least of all, on account, perhaps, of the superabundance of the population, and the general struggle for existence, it need not surprise us if the science of surgery and medicine are at a low ebb, and that there is no such thing as a medical department in their army When a soldier gets ill he seeks for a native doctor in the nearest village, after his comrades have expended all their medical skill upon him; and if he gets no better, or if he is unable to perform his duty, he is dismissed from his corps, and allowed to go home, to get well or die, as it may be. If he is engaged on active service, and is wounded, he does not long remain an incumbrance to the State, as he also is per-

mitted to go home, or to seek whatever native surgery can do for him at his own expense. For sick or wounded there is no hospital, and there are no army surgeons; and were there any, what helpless creatures they would be without medicine or appliances! I recollect visiting a large camp situated not far from Shanghai, at a time when cholera was epidemic in the locality, to see what was being done for the poor creatures, and on passing by an empty house, having neither windows nor doors, I saw a number of the men from the adjacent entrenchments lying on the ground on straw, with their own scanty clothing upon them. Some of them were without even a bowl of water to quench their insatiable thirst. They were simply brought there out of their tents by their comrades, who were only too anxious to get rid of the nuisance of having such sick people near them. Several of them were already dead; and as I passed by, a Chinaman, well dressed in the costume of the better classes, having a fan in his hand, and his nose stuffed with an aromatic smelling leaf, was looking in through the open window. I learned that he was a native doctor who was appointed by the Taou Tai to look after the cholera cases in the camp, and he did look after them in the way I describe, and counted them when they were dead. But even had he had all the medicine at our disposal, he could have done nothing without a proper building and hospital organization; all which would cost too much money. According to their notions, it was far more economical to let the men die, and get new ones in their stead; hence they have no army medical department or army hospital.

On another occasion I was requested by Captain Kingsley to see some of the Chinese soldiers who were under his command, while being instructed in foreign drill. Contrary to the advice of the Commanding Officer, his corps was sent along with a large force of Imperial troops on an expedition against the Taeping rebels, in a position not many miles from Shanghai, with the idea that being in a semi-European uniform, and able to march and manœuvre like a European regiment, their appearance would be enough to frighten the rebels, who had a great terror of foreign soldiers, and thus they might favour the attack of the Imperialists. Unfortunately, they were marched to a very exposed position in the front, and being a raw levy of young recruits, and without their drills to guide or lead their movements, they suffered severely, and lost several men killed and wounded. It was some of the latter I was requested to see; and on going to the boat in which they were brought back to Shanghai I never witnessed a more horrible sight. There were nine bodies literally floating about in their own blood. When they were put on board, the men were alive, but having had no attention paid to their wounds, they had bled to death. Four of the original number who embarked, survived, and I extracted bullets and dressed their wounds, much to their satisfaction. Chinese are very expert in contriving litters for carrying wounded men. On one occasion I met two men carrying another in a large basket suspended from a bamboo by a rope, and on another occasion the wounded man was carried on a door, suspended in a similar manner.

I cannot ascertain whether the Government allows any compensation

for wounds or loss of limb occasioned by active service, but should rather think not practically, at all events, if they do so theoretically. As the wretched dishonesty of the mandarins would make any scale of pay a nullity, and the wounded soldiers in the north of China, whom I had under treatment in hospital, had nothing allowed to them, they only looked forward to return to their villages, when they would receive support from their friends and relatives.

Colonel Gordon, while in command of disciplined Chinese troops, insisted on a medical staff and establishment being made a part of the organization of his force; and during the time it was in existence, a period of thirteen months, it proved highly useful, as shown in the report of the medical officer in charge of it, Assistant-Surgeon Moffitt, of the 67th Regiment, and no doubt many poor creatures who would have died from their wounds on the field, or afterwards lingered in wretchedness, were either returned to the force as efficient soldiers, or recovered sufficiently well from the immediate effects of their wounds to return to their homes or friends, so that on grounds of humanity alone the intention was praiseworthy.

Chinese soldiers appear to be very amenable to military discipline; whether this is owing to the severe penalties inflicted for any infringement of military law, or to a naturally submissive disposition, it is difficult to say, though probably both have much to do with it. The severity of the punishments may be necessary on account of his psychological characteristics, which will be alluded to presently. Decapitation is of very frequent occurrence in the Chinese army. The offences which entail this punishment are violence or gross disrespect to a military mandarin, robbery, desertion, and crimes of that class. After decapitation, the head is exposed in some public place. While with a small British force occupying the city of Taitsan, as a moral support to the Imperialists, then engaged at the seige of Suchow, in October, 1864, I was passing through the narrow main street one afternoon, when my attention was drawn by a crowd of people looking at what proved to be the head of a Chinese soldier, who had just suffered decapitation. The head was fastened to a doorpost of a shop in the main street, at the corner of a by-street, in the manner shown in the illustration (Fig. 16), and was placed no higher than the level of the heads of the people walking by. The long tail of hair worn by all Chinamen was used as a rope to fasten the head to a nail driven into the wooden doorpost, and, at the same time, served to fasten up a board having a piece of paper spread on it with Chinese writing, setting forth the name of the man, his place of abode, and the nature of the crime he committed—in this instance, highway robbery. While looking at this head I was much struck by observing the quantity of saliva that continued to flow from the mouth, and on examining the appearance of the wound, a very jagged one—indicating that it was not done by one clean cut—I observed that there was a remarkable spasmodic action of the incised muscles of the back of the pharynx and tongue, and continuing to notice this for a little time, I found that the action of the contraction and relaxation occurred at irregular intervals, and that all the muscles appeared to act together. That this was or was not an

evidence of consciousness or of thought passing in the mind of the individual, may be a difficult problem to solve, but be this as it may, I could not help recording the exclamation of one of our soldiers, an Irishman of course, who was standing by, and observed me watching the muscular movements, which he also noticed. "Arrah Sure! Sir," said he, "I think he is striving to spake." On completing the sketch—it occupied in all about ten minutes—I noticed that the muscular movements continued to be nearly as active as at first, and as the evening was warm, it was not improbable, that they continued for some time longer.

This exhibition of the head was intended as a warning to the Chinese soldiers as much as to the people of the place, most of whom, owing to the country being in a very disturbed state, and but lately subject to the Taepings, were in great wretchedness and destitution, and were only too ready to commit robbery for their maintenance. Such exhibitions are of very frequent occurrence in China, and have a most demoralizing effect, inasmuch as they familiarize the mind with cruelty, and excite feelings the reverse of respect for the sacredness of human life, happily pervading the people of the more civilized west.

The Chinese soldier, like the generality of his countrymen, is by no means addicted to intemperance, the bane of the British army. Seldom indeed is it that a drunken Chinaman is met with, although they do not eschew alcoholic drink as if they were teetotallers, on the contrary they generally take a small quantity at their meals when they can afford it. But what alcohol is to the British soldier, opium is to the Chinese soldier, and it gives almost as much trouble to their military commanders, and requires the infliction of severe punishment for its restraint, as intemperance does to our own commanding officers. The punishment usually practised by the Chinese for this offence, is to stick small arrows, a few inches in length through the lobes of the ears, and to lead the culprit about the camp for a general admonition. But we can understand how ineffectual punishment is, when we know that the desire of the opium smoker for opium, "is like the greed of the hawk for flesh," as the Chinese describe that peculiar craving of the *habitué*. Opium has the effect of injuring the health and sapping the strength of those who addict themselves to it. They have a stupid look, have no energy, and when required for duty or parade, they are likely to be labouring under its sedative effects, and sleep so soundly as not to be easily awoke; it does not make them riotous however, or violent, as alcohol does.

For such offences as breaking out of camp, talking in the ranks, negligence in performing drill, and other offences of a minor character, the punishment inflicted consists of so many blows of a bamboo, varying from 50 to 200, according to the gravity of the offence. This punishment is inflicted by men set apart for this especial duty. There are two or three in every camp, and it is their business to be present at all parades, in case their services should be required, which is very often the case. They are called the bamboo men, and the bamboo they inflict the punishment with, is about 4 feet in length, and broad and flat at the extremity which inflicts the blow; it is about 2¾ lbs. in weight.

The man who is to be punished lets down his trousers, and lies on the ground, face downwards, so as to expose the back part of the thighs, on which the blows, given with considerable rapidity, are inflicted. A man assists in holding down the head and shoulders of the culprit during the operation, and another holds or sits on his legs if he is not sufficiently submissive. This punishment may be made very severe, and produce a considerable amount of abrasion of the integuments, and bleeding; and even in ordinary cases, it causes some amount of pain, as evidenced by the shrieks of the sufferer.

These punishments are inflicted in a very summary manner, by the order of the officer commanding, in the presence of the parade where the offence has just been committed. There are no courts-martial, long legal investigations, or courts of inquiry, nor is the approval of the highest military authority in the command at all necessary. The military commandant of the garrison (if of sufficient rank to be invested with the power of life and death) orders the infliction of capital punishment as soon as he is satisfied with the guilt of the individual, from the written statement of the evidence, or even without this formality in war time. As an instance of the irresponsible power exercised by the commandants of regiments, I may narrate an occurrence which took place at the Camp of Instruction at Foug'-wan-shan. While Major Jebb was paying a visit to one of the commandants, by name Yuen, one of his men was brought before him on a charge of desertion; the commandant who appeared to be in a great rage, ordered the deserter's head to be cut off, when Major Jebb entreated the mandarin not to have it done. After a little demur, the latter acceded to Major Jebb's request, but before it was noticed what he was going to do, the mandarin took out of his pocket a penknife, which Major Jebb had just made a present to him, and opening the blade cut off the deserter's ear, and told him to be gone.

A Chinese regiment on the march is a very curious sight, and provokes much ridicule in any one who has been accustomed to see a European regiment under similar circumstances. The men observe no order, unless that of walking one after the other may be called marching in single file, and this they are in the habit of doing on the narrow pathways, through their paddy fields and extremely narrow roads, and over the peculiar bridges found in all the provinces of China, except those in the further north. The men are only recognised to be soldiers by a white patch, on their dingy looking jackets; in other respects they might be mistaken for a number of coolie labourers, carrying bundles of odds and ends. No two of them are equipped alike; for instance one carries his matchlock over his shoulder, and has suspended from it at one end his bedding, in the form of his rezie rolled up, and from the other a pair of heavy boots, to be worn in wet weather, and in addition to these, a bundle of cloths, fastened together by his turban, he himself walking bareheaded and barefooted. Behind him follows a coolie-looking fellow, carrying a couple of cooking pots, and a bag, perhaps of rice, or some other bundle of impedimenta. Then come a couple of banner men, using their long bamboos, to carry some bundle or other suspended between them, it may be a tent. Altogether it seems

the least military looking procession one can well imagine. Most of them carry umbrellas, fastened to their backs if the weather is dry, or in hand and open if wet. This is the case with Chinese troops of the old school, when marching from camp to camp. With those who have been drilled after the European method it is different, the heavier musket or rifle and ammunition are quite enough burden for a man to carry, without encumbering himself with other things, and unless it be a blanket worn horse-collar fashion over his shoulder, he has no other encumbrances. They take a pride in marching in some order resembling a European corps, whenever the width of the road permits them to observe some formation, such as two or four deep.

The transport employed in the movement of troops, varies with the locality where operations are carried on. Where there is water communication—generally the case in the central and southern provinces—the boats of the country are employed for transporting material, and the Chinese being admirable boatmen, their movements are carried on with considerable expedition. Steamers of very light draught have been employed on recent occasions in the service of the Imperial Government, but there is often such an accumulation of water plants in the canals and creeks, that their movements, especially if they are screw steamers, are frequently impeded. In the further north, where the country is open and when the rivers are few as compared with those in the more southern parts, carts, very much resembling those used in some parts of Europe, are frequently met with; the animals employed in draft being either oxen, ponies, or mules. Each cart will carry about ten men with their baggage, consisting of bedding, cooking utensils, and arms; their progress is at the rate of about fifteen miles a-day over good roads. Where neither carts nor boats are available, coolies are employed; two will carry about 1 cwt. suspended between them in their own fashion, from an elastic bamboo pole resting on their shoulders.

When marching out to action it is pretty much the same as when on parade for exercise; all are then equipped in regular order, their arms ready for use, and their banners unfurled, and as there is a banner in the proportion of one to every 10 men, there are a great many to be seen with a large body of troops. These banners have a very gay and even gaudy appearance, being made of silk died of bright colours; some are very large, being 6 to 8 feet wide, and about 12 feet long. The margin is sometimes serrated in a peculiar shape, after the conventional mode of delineating flame, and at others it is plain and straight. They usually have some motto, inscribed in large characters upon them, and each corps has a uniform pattern. They are suspended from a straight bamboo pole, about 13 feet long, tapering to a point, which is terminated by an iron spike, and intended for use as an offensive weapon as occasion may require, and one of the exercises they go through on parade is thrusting with this banner pole. This requires a good deal of strength and expertness, and certainly in their hands it has all the appearance of being a very formidable weapon. They would be very formidable for cavalry to encounter, the bright colours of the flag being quite sufficient to turn any horse. Their

principle object is to make display, and inspire terror into their enemy by showing how numerous they are, and to give confidence to their own men. The modern disciplined Chinese troops have done away with these banners in their corps, though the divisional commanders retain a number about their persons for state display.

With infantry the matchlock is the common arm in use (Fig. 17). It is a very rude and primitive weapon, and very inefficient unless at very close quarters, the bullet being not much larger than a good sized slug, weighing about one drachm and a half. These bullets appear to have had very little penetrating force:—in most instances of wounds caused by them, during the attack on the Taku Forts, they did not penetrate beyond the integuments. I removed one from the lobe of the ear, another from the lip, and many of the men found them in the folds of their great coats, which they wore horse-collar fashion during the action. The length of the barrel is about 38 inches, and the stock is short at the breech, having nothing to rest it with against the shoulder. It is held in the right hand close to the cheek when being fired, the left hand supporting it further up the barrel. There is no trigger guard, and the match holder is made to move by a lever arrangement in the wood-work of the stock near the breech. The matchlock is loaded with loose powder, kept in a powder-horn, the proper quantity being guessed by first pouring the powder into the hand. The bullet is put into the mouth and wet with saliva, is simply dropped into the barrel. The moisture on the bullet makes the powder adhere to it, keeps it in its place, and makes it fit the barrel closely. After this has been done, a finer grained powder is poured from a second powder horn into the priming chamber close to the touch hole. Then the lighted match is applied to the match-holder. Notwithstanding the apparent clumsiness of the mechanism, all this is done with wonderful celerity and expertness, from long-continued practice; and on seeing the Chinese soldiers at ball practice, they appear to have as elaborate a formality in their position drill as we have in our rifle practice.

A regiment at ball practice parades in line about one hundred paces from the target, and each man in turn steps a couple of paces to the front, goes through the process of loading, priming, fixing his match, taking aim, and firing, and, if successful, in hitting the target, which is known by the sound of a gong struck by a man placed at a little distance off, he walks straight up to a mandarin, seated in a tent close by, who enters his name in a book. The target is of very simple construction, being made of a piece of bar iron, bent so as to form a frame-work, about five feet high and two feet wide, the two ends being stuck in the ground. On this is fastened a piece of cotton cloth, having a mark for a bull's eye near the top. The men appeared to show much eagerness in hitting the mark and getting recorded, whether owing to a reward in money or to other advantages I could not ascertain.

These matchlocks are rapidly giving way to percussion muskets, whose superiority is now acknowledged, notwithstanding their greater cost, and the greater expense of the ammunition used with them. Even Enfield rifles are now found to some extent, and in time the

newest form of breech-loader will, no doubt, be adopted. The jingal is merely a large description of matchlock. Two men are required to carry this weapon, and when fired, it is still supported on the shoulders of the second man. The butt is made longer in proportion to that of the matchlock, to rest it against the shoulder. It is loaded and fired the same as the smaller matchlock. The bullet is made of iron, one and a quarter inch in diameter. Another description of jingal is so heavy that two men are required to carry one, while a third man directs the aim of the piece—the ammunition is divided among the three men (Fig. 18).

Just previous to the departure of the Army of Occupation from Tien Tsin, nearly all the forges of the town were actively employed in forging jingal barrels of the largest, as well as of the ordinary size, to supply the demand for arms required for the defence of the place against the Taepings, who, it was thought would pay Tien Tsin a visit on the departure of the English troops. There was thus an opportunity of seeing the manufacture of the gun barrel in all its stages. The first stage was hammering out the thick iron into a sufficiently manageable size for twisting it into a long spiral curl corresponding to the size of the jingal—the spiral was next welded into a compact tube, and by a good deal of skilful manipulation a pretty fair barrel was produced. The next operation was to close up the breach by carefully welding in a piece—the barrel was next bored by an apparatus, like an augur, and worked in a similar manner with the hands—it could scarcely be expected that the result could be an even smooth bore when the rudeness of the apparatus is considered—smoothing the outer side of the barrel by filing, and drilling the touch-hole, completed the operation. The simple lock for the match and the wooden stock were made by the same hands as forged and made the gun barrel.

It was noticed that much English bar iron was used in making these jingals; the blacksmiths said it was very good, and doubtless it saved a considerable amount of labour, compared with the half-puddled native iron. Strange, that almost the first use to which the first imported English iron was applied, was the manufacture of these jingals!

Some regiments have a certain number of men, armed with large jingals, attached to them. They take part in the exercise at their parades, which appears to consist of a series of movements in marching and counter-marching, the whole having a pretty scenic effect, well adapted for a pantomime. During these performances the gongs are struck, and the long trumpets are blown, and the drums are beat, so that there is a din of horrible discordant sounds, which, however inspiriting to a Chinese soldier, are utterly intolerable to our ears, and are hardly to be classed as martial music (Fig. 19).

One of the exercises performed at these parades is the wielding of a large, heavy, iron battle-axe, about forty pounds in weight (Fig. 20). It is more a gymnastic exercise, and is looked upon as a feat of strength.

The cavalry are more numerous in the further north of China than in the more central or southern provinces. The country being more open, and little traversed by canals or rivers, allows of their move-

ments. These horsemen are mounted on strong, hardy, enduring ponies, of a Tartar breed, of considerable swiftness, and capable of withstanding, without stabling, a temperature below zero in winter, and the highest heat (108°) in summer. They are, no doubt, of the same stock as the Tartar ponies met with in the Crimea, and common to the whole area of Central Asia. They stand from twelve and a half to thirteen hands high. They are bred in large numbers in Mongolia and Manchuria, and from thence they are sent to the furthest south of China for sale.

In times of emergency Mongolian cavalry are employed, and the cavalry that fought against us in the north of China during the last war were chiefly derived from Mongolia (Fig. 21). They were armed with matchlock, sword, spear, and bows and arrows, and at the engagement at Sinhoe showed considerable daring in attacking the second division, which they had surrounded; and no doubt if our army had been Chinamen, this movement, which appears to be one of their great manœuvres in war, would have intimidated us, and made us fall an easy prey. They came so close—within 400 yards—and with such a plucky, jaunty air, to the left flank of the second division, that the order was given to "form square to receive cavalry." This movement seemed to surprise them and arrest their course, and a few shots from the Enfield rifle, and some rockets fired into them, made them retrace their steps, which they did without much hurry. Their appearance right in our rear obliged us to send a couple of Armstrong guns and a company of the 67th in skirmishing order against them. They were sufficiently swift to escape from our cavalry, though we were apparently better mounted. On only one occasion did our cavalry get sufficiently close to them, and even then but few of them were cut up. The great mass escaped by their better speed. Had these men been armed with breech-loader carbines instead of their own rude weapons, they might have done considerable execution.

A Chinese saddle (Fig. 22) is a very clumsy affair, and exceedingly heavy; a saddle and saddle-cloth on trial, weighed 27 pounds. The seat is much higher, and before and behind there is a high ridge of wood forming the tree. A large piece of leather forms a flap which covers a good portion of the horse's flank, and the stirrups are very large and made of massive iron; a thickly padded cloth is worn under the saddle to prevent its chafing the skin of the horse's back—no spurs are used. They have a very severe whip, made of short thongs of thickly plaited hide, with a short handle about a foot or so in length. The bridle is in shape much like our own, and the bit is a snaffle, with large rings for movable cheek pieces (Fig. 23).

Their sword, of little value as an offensive or defensive weapon, is made of iron, is very heavy, and worn on the left side in a sheath suspended from the girdle. It is used by bowmen and spearmen, and could only be effectual in decapitating the unfortunate victim who might fall into their hands. Some bodies of Chinamen were found near the summer palace at Pekin some days after the allied army had left its precincts; they were lying on the ground, and on their backs, which were uppermost, the marks were seen of where the swords had

been wiped, by drawing the blades to and fro, on the clothes covering them, while their heads were seen suspended by their tails from the branches of the nearest trees. For such occasions the swords are useful. Nothing appeared to excite the admiration of Chinamen so much as the elastic spring of the blades of our swords, their own being made of soft iron remain in the position in which they are bent.

Some spears were picked up on the fields on which we had encounters in the north of China. They were rather short in length, being only between 6 and 7 feet long; the heads were made of iron, having a long flat blade of about 6 or 7 inches, and terminating in a sharp point, about $1\frac{1}{4}$ inch at the broadest part. The remainder of the blade, about 4 inches in length, formed a socket which fitted on a pole 5 or 6 feet in length, made of a strong piece of wood, about $1\frac{1}{2}$ inch in diameter, apparently the branch of a yew tree, and terminated at the further end by a ferule of iron. At the part where the blade was joined to the shaft there was a bunch of horse or yak hair, died a bright red colour (Fig. 24–2).

Strange that the most perfect weapons of precision, the Enfield rifle and the Armstrong gun, those great inventions of the age we live in, should, on the very first occasion in which they were applied, be brought face to face with the most primitive and the most ancient of all weapons of warfare,—the bow and arrow—and yet so it was in the last war in which we were engaged in China. That bows and arrows formed part of the military equipment of the Chinese there is no doubt, as our men were wounded by the latter, and at the northern face of Tong Ku, near the north-east angle, there was a space of 20 yards along the further side of the ditch covered with their arrows, which were stuck into the clay to a depth of 5 or 6 inches. The position of these arrows indicated at once that they had been fired by bowmen, standing inside the intrenchment below the wall. They must have been fired almost straight up into the air, as they all stood nearly upright, being inclined at an angle of about 15 degrees from the perpendicular. It is thought that they were meant to hit some person supposed to have approached near the place during the night to make a reconnoissance, and had he been in that particular place, it was impossible that he could have escaped. The number of bows and arrows found in the numerous guard-houses about the summer palace was very surprising, the defence of this important place, being apparently altogether confided to bowmen. Against an unarmed mob they would no doubt prove effectual, but before the common musket they must have been perfectly useless. Even against their own clumsy matchlocks they would stand but a poor chance, notwithstanding the rapidity with which they could be used.

Some of the arrows had a wooden hollow ball, instead of a point, this, when shot off, made a noise like a whistle and could be used as a signal; another form appeared to be made use of to set fire to buildings by means of a firework attached to the end of it.

Proficiency in the exercise of the bow and arrow is essential to qualify for promotion to the higher grades in the Chinese army, and accordingly, much practice is required in order that the candidates

may show themselves sufficiently expert. Du Halde tells us that the military mandarins, or officers of the army, must pass several examinations as well as the literary mandarins, and give proof of their strength, dexterity, and experience in the art of war; accordingly there are three degrees among them which they are to take, viz., those of bachelor, licentiate, and doctor of arms. It is curious to notice that even in the exercise with the bow, a particular formula had to be observed in the way of position, which appeared to be even more elaborate in all its details than the position drill of the match-lock. The exercise with the bow on horseback was very exciting, and really deserving of admiration. It was as follows, a space of about 200 yards of level ground was selected, and at the distance of every 50 yards there was a bundle of straw erected, the size and height of a man. The horseman, his bow and arrow ready (Fig. 25), started his horse at full speed, and as he passed within ten yards of the first bundle of straw he shot his arrow at it: then taking out another from his quiver or from the belt into which they were inserted loosely, he shot it at the next bundle of straw, and so on in succession, until he passed the last bundle, when his pony, who had continued at full speed throughout, stopped immediately, being trained to do so, as soon as his withers were touched by his rider's hand.

It requires a considerable amount of strength to pull a Chinese bow, it being made of very unyielding materials, chiefly thick bamboo, strengthened by a thick layer of buffalo or ox horn on the inside. So strong is the bow, that the string requires to be made of cat-gut nearly half an inch in thickness. It is efficient enough to kill a man at sixty or eighty yards. It is held in the left hand, and the string is drawn up to the right ear. The arrows are about 32 inches in length, armed with iron heads of various forms, round, square, and flat. The shaft is made of deal, half an inch in thickness, and feathered at the end with three feathers. It is not unlikely that even now, bows and arrows worn as of old, in bow-rack and in quivers, form the equipment of portions of the Chinese army in the further north. At a time when such weapons were used exclusively, shields and armour were no doubt of use, but they were not employed in the last Chinese war. Men armed with shield and sword appeared among the Taeping rebels. The shield was made of bamboo, plaited thickly together, and could resist an arrow or sword cut.

At the capture of the Taku Forts, several cross-bows were found, and some of our men received wounds from short arrows projected by them. The dimensions of these bows were very small, the bow being hardly 22 inches in length; and the barrel, which was covered over throughout, with a slot for the string of the bow to move in, was about 12 inches in length (Fig. 26). As a weapon of either offence or defence, it was wonderful how any reliance could be placed on what boys would hardly be proud to play with as a toy; and yet they were found there, and they were used in projecting arrows about eight inches in length, and having a sharp iron point at their extremity. The cross-bow was a form of weapon used to a great extent in the

ancient wars of China, and old prints have representations of very large ones mounted on regular stands.

Such is the nature of the equipment of the Chinese army, and with which they have hitherto carried on war. Of late years a great change has been attempted, and an effort has been made to adopt the appliances and the methods used by western nations. The futility of their own arms against those of the Allies in 1860, no less than the wonderful efficiency of a small force of Chinese, disciplined in a rude way, and armed with weapons of a superior description to their own, in contending against the great Taeping rebellion, which shook the stability of the empire far more than the foreign invasion, made the Chinese Government alive to its danger, and the necessity of a change in its military system.

In the spring of 1862, a request was made by some Chinese officials to Brigadier-General Sir C. Stavely, then commanding at Tien Tsin, for permission to allow Chinese soldiers to be taught the European method of drill and manœuvring in the field. This request was acceded to by the British Minister at Pekin, to whom it was referred; and a number of Manchu soldiers, under their officers, numbering about 100, were put in the hands of several drill sergeants of the 67th Regiment, under the adjutant. They commenced with the usual initiatory goose step, just as if they were recruits joining one of our own regiments, and soon their ears became familiar with "Wan, Tow," "Wan, Tow," pronounced in the barrack square vernacular, and so with the other words of command, which were all given in English. In time they could pronounce these words themselves, and continued to use them when they became drill instructors to their own men; and not long since a regiment of Chinese were seen going through the movements of battalion drill at Pekin, when the words of command employed were English, and not Chinese. It is, therefore, quite possible, that in future ages ethnologists may begin to trace an affinity between the Tartar and Anglo-Saxon races, by discovering traces of several English words which have been engrafted on the Manchu and Chinese languages.

These men above-mentioned were armed with rifles of the regulation Russian pattern, five hundred of them having been sent as a present from the Russian Government just at that time. During the rest of the time of our military occupation in the north of China, there was a considerable body of Chinese troops undergoing instruction under our officers; and on one occasion, when the Shantung rebels made an incursion into the province of Chili, a large force, consisting of some foreign-drilled regiments, were sent against them under the command of Major Coney, 67th Regiment. This force succeeded in driving the rebels out of the province, and proved the advantage of their modern equipment and instruction, in a sufficiently satisfactory manner.

On the arrival of the 67th Regiment at Shanghai, in 1862, a similar request to have the local troops drilled after our fashion was made by the governor of the city, and a regiment was at once recruited for this special purpose, and placed under the command of Captain Kingsley, 67th Regiment. The inferiority of their physique compared with that of the more northern Chinese was at once seen, and it was some time before they could understand the utility of the goose-step movement, which

they manifestly regarded as an imposition, and looked upon as a most irrational mode of wasting time. Their further progress, however, was more satisfactory to them, and when they got to the advanced stages of battalion drill, they showed sufficient expertness and steadiness after a good deal of drilling.

Subsequently a large body of troops was placed under instruction at a short distance from Shanghai, and a regular camp of instruction was afterwards formed, under the command of Major Jebb, 67th Regiment, and the men were instructed in battalion drill and artillery practice. Some of these men were sent to the front during the operations against the rebels, under Colonel Gordon, and did good service; and subsequently they became the means of instructing the troops under command of Chinese officers. The words of command having been translated into the local Chinese dialect, Chinese and not English words of command were used. They at first adopted a modernized dress, made of blue serge cloth, somewhat after a European pattern, and wore a turban of black, red, or light-blue colour; from these peculiarities of their dress they got the name of "Imitation foreign soldier." (Fig. 27). In this respect they resembled the troops immediately under the command of Colonel Gordon. As this appeared to be too great an innovation for the Chinese, the troops who were subsequently under instruction, were dressed after a more national manner, being, however, strictly uniform as to the colour of the coat, breeches, leggings, shoes, and turban, also as to the material and shape. Some coats, however, were not buttoned over the right breast, but joined in the middle. The men were of course equipped with a musket—the old Brown Bess, with a percussion lock—or with a few Enfield rifles. This entailed cross-belts or waist-belts, to carry the ammunition pouch and bayonet; but in other respects they only differed from the matchlock men of former days in being more tidy and better clothed, as seen in the accompanying illustration (Fig. 28), in which the local country fashion of shoes, leggings, and breeches are used, the jacket being the only military part of his dress.

At the camp of instruction at Fong wan Shan under Major Jebb, were two stockades, containing about 500 men in each, besides 200 artillery. Of these there were 150 armed with the Enfield rifle, and the remainder with the old musket. For the artillerymen there were 4 howitzers, 4 mortars, and 3 rocket-tubes. There were five English officers, who carried on the instructions under the command of Major Jebb and an interpreter.

The men rose for roll call.	5½ A.M.
Parade and drill	6 A.M in summer, 10 A.M. winter.
Breakfast	8 A.M.
Dinner	4 P.M.
Parade	5 P.M. in summer, 3 P.M. winter.
Bed	9 P.M.

There were a few men instructed in the bugle, who gave the usual calls for drills, parade, tattoo, and exercise in light infantry drill as in

our own regiments. The native officers of a battalion under the Commandant Yuen, consisted of a major, who always appeared on parade in command, an adjutant who performed the duties of adjutant and sergeant-major, 4 captains, 4 lieutenants, 4 sergeants; each captain had command of a company, which seldom mustered more than thirty men or so on parade, at a time, he had also a lieutenant under him and a sergeant and three corporals. The native officers lived in quarters in the village close by, while the commandant remained in his stockade. They were all very little different in appearance from the men they commanded, except in dress, which was peculiar (Fig. 29). They may have been perhaps smarter and more intelligent than the privates, and were no doubt derived from a better class of the population.

The physical character of the inhabitants of China varies very considerably throughout the continent. The Cantonese is strong, muscular, broad-shouldered, and short in stature, his limbs being well-proportioned, and capable of considerable endurance and labour. Some of these men added great strength to the Taeping rebels, and were an important element in their army organization. The people of Shanghai and the province in which that city is situated (Kiangsoo) are comparatively speaking, very effeminate in character, of slender build, and less muscular than either the Cantonese or those of the provinces situated further north. As soldiers they are very inferior. Those of the provinces of Chili and Shan tung are tall well-made men, and the obstinacy with which they fought at Taku and elsewhere, shows that they have no mean qualities for soldiers. They also appear capable of very laborious work, requiring good muscular development, as seen by the enormous loads they carry as water-carriers or coolies in the streets. The Manchus are a fine race but not very tall. The Mongolians are of smaller stature. The tallest troops in the north of China appeared small when standing beside our artillerymen. By far the smartest and most military looking body of men, although not of very large stature, which I saw in the camps near Shanghai, and in the large number of troops collected before Suchow and elsewhere, were the men from the province of Honan. The Honan regiments were always smart and clean looking, the men had a better expression of countenance, and were cleaner limbed, and carried themselves better than the men of other regiments. Those who have seen the Chinese soldier in action, bear testimony to his good qualities; and though in attacking a strong position he requires to be led by men of a more courageous race, he still follows; and an instance occurred where Chinese soldiers stormed the breach after being repulsed twice previously in succession at Taitsan. The death of a comrade does not appear to inspire fear in the man standing beside him, on the contrary, a hearty laugh generally is the result, and though better behind walls, these soldiers do not hesitate to go to the front when required.

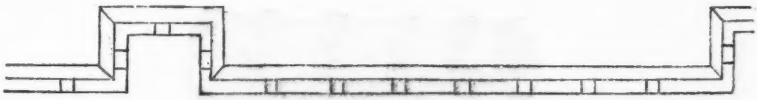
On the capture of a place the Chinese soldier is utterly unrestrainable, he fires off his musket at any object, even into a house when there is no necessity for so doing; his great ambition is to cut off heads, and old men or children soon fall victims to this insatiable desire. His cruelty is the cruelty of a fiend, and the unfortunate

captives taken in war time are treated with the most barbarous cruelty, such as tying to a stake and cutting off, piece by piece, flesh from the limbs, gouging out the eyes, taking out the tongue, cutting off the ears, &c.: some have been seen stretched on the ground and fastened to stakes by the hands and feet, and the head also made fast by the hair to a stake in front, while burning spars of wood were placed under the victim's neck. To decapitate a man is a great object of ambition, and for this purpose every man carries a long knife or short sword (Fig. 30) behind his back, fastened to his girdle, and it is wonderful how expertly, or rather how easily a head may be cut off. I have seen some men, who have recovered, with the marks of fearful gashes at the back of the neck. Next to satiating his cruelty, his impulse is to loot, and a story is recorded that, after the capture of a city from the Taepings, the captives were made to carry the bundles of loot, and on arriving at the Imperialists' camp, had their heads cut off by way of recompense; but this perhaps is one of those exaggerated stories which have been told against the Imperialists, who certainly were not less cruel than the rebels. The Chinaman is peculiarly submissive to correction; when beaten by whip or bamboo by way of punishment, and while still smarting under the infliction, his first duty is to thank the officer who orders him to submit to it, and even on suffering decapitation, instances have occurred where he has been seen to kneel down and bend his head for the executioner's knife, on hearing the order of a mandarin.

They are expert thieves, and frequently band together for robbery. They turn pirates without hesitation when an opportunity offers, and make no more hesitation or scruple in fighting against people of their own province, than if they were foreigners. Colonel Gordon employed the rebels he captured, in his army, and found them ready to fight their comrades the day after they were captured. Naturally industrious to an extreme degree, and given to peaceful trading or mechanical occupations, they lose all such habits after a short time, when employed on active service or even in camp life. A large army is hence a source of great anxiety to the state, as the soldiers being unfitted for peaceful pursuits, when disbanded, become too apt to be lawless, and turn to piracy or brigandage; so much so is this the case that a severe winter, or an epidemic of cholera is regarded as a great ally to the Government in decimating disbanded men, who are looked upon as useless members of society, and who being without recompense for their services, or without pension, must live a life of indigence.

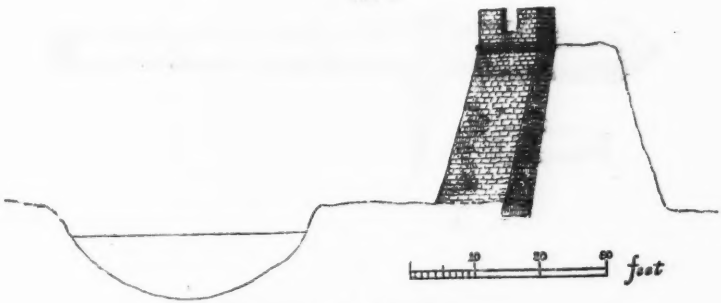
The Chinese soldiers have shown great respect for and even attachment to the English officers who have had command of them. Besides the skill with which they were commanded, and the confidence superior courage inspired them with, there is no doubt that the great charm which made the Chinese serve so willingly under them, was the correctness and punctuality with which they received their pay. When a Chinaman finds that he gets his pay regularly and exactly, he is most faithful and loyal as a soldier, a servant, or in whatever other capacity he may be employed; but let there be incorrectness, or long arrears,

FIG. 1.



Plan of a City Wall with the Flanking Defences.

FIG. 2.

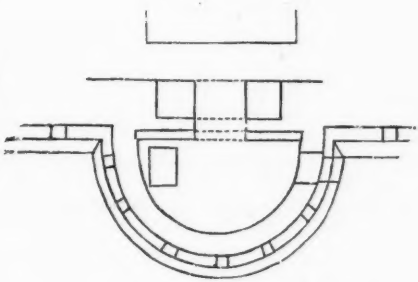


Section through a City Wall and Ditch.

FIG. 3.

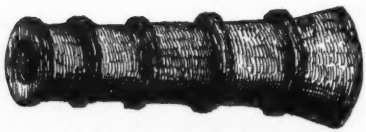
West Gate of City of Shanghai.

FIG. 4.



Ground Plan of West Gate of Shanghai.

FIG. 5.

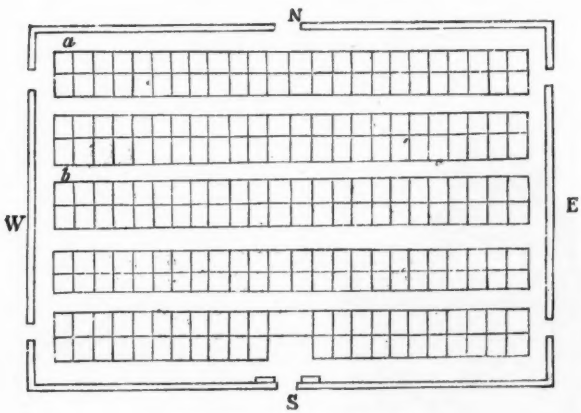


Original Form of Chinese Cannon.

FIG. 6.

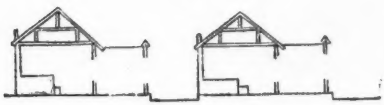
Ancient Chinese Breech-loading Cannon.

FIG. 7.



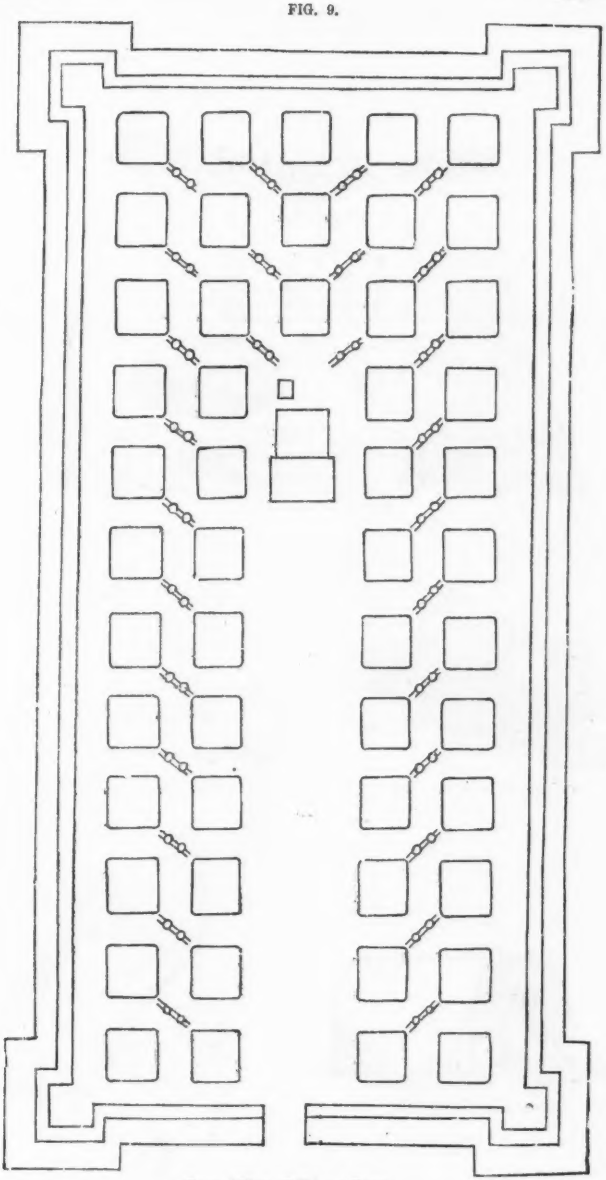
Ground Plan of Barracks at She-ling.

FIG. 8.



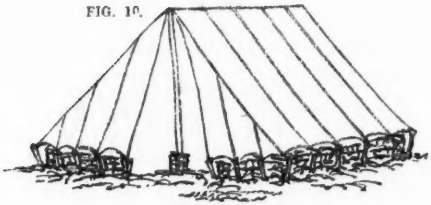
Section through *a b* of Ground Plan of Barracks at She-ling.

FIG. 9.



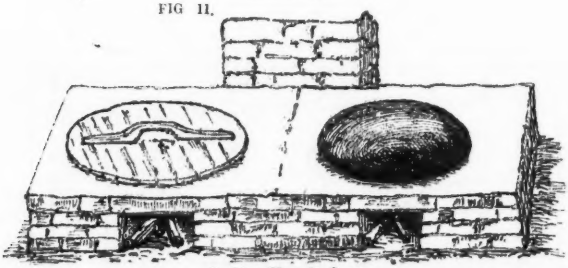
Ground Plan of Chinese Camp.

FIG. 10.



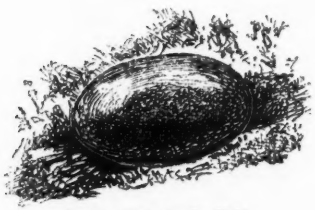
Chinese Tent.

FIG 11.



Cooking Place in Camp.

FIG. 12.



Cooking Place in the Field.

FIG. 13.

Watchman's Rattle.

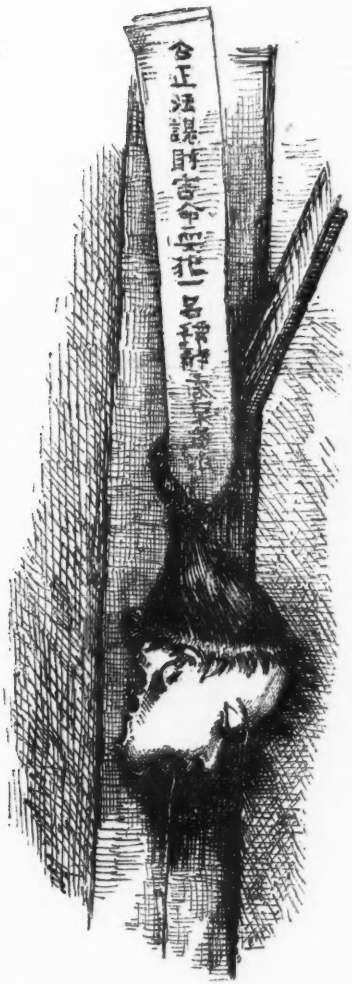
FIG. 14.

Military Hut used at Taku.

FIG. 15.

Chinese Soldier's Turban.

FIG. 16.

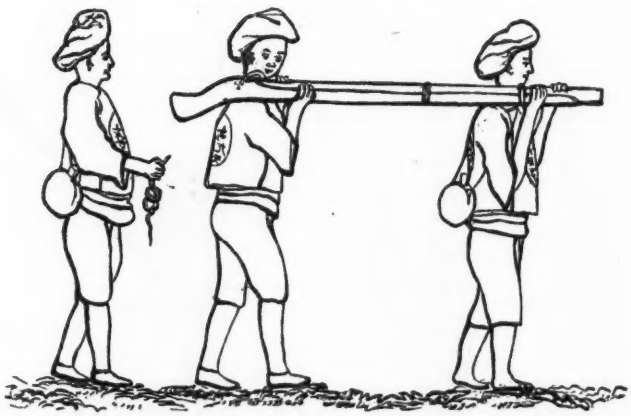


Head of Chinese Soldier after Decapitation.

FIG. 17.

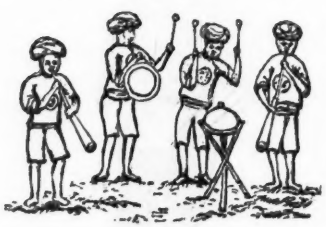
A Chinese Soldier armed with Matchlock.

FIG. 18.



Jingal Men.

FIG. 19.



Chinese Military Band.

FIG. 22.

Chinese Saddle.

FIG. 20.

Heavy Battle Axe for Exercise.

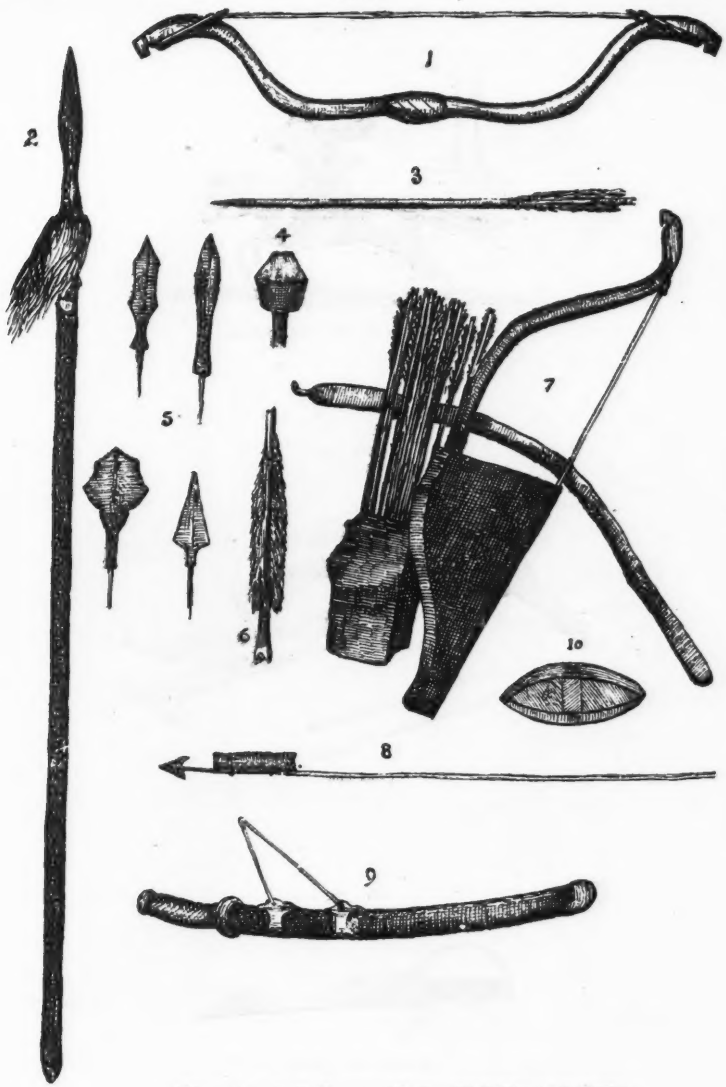
FIG. 23.

Chinese Bridle.

FIG. 21.

Tartar Cavalry Soldier.

FIG. 24.



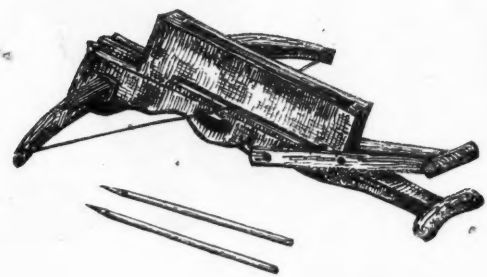
Chinese Arms, in the Museum of the Royal United Service Institution.

1, Chinese Bow. 2, Spear. 3, Arrow. 4, Head of Whistling Arrow. 5, Arrow Heads. 6, Feathering of Arrow. 7, Quiver and Bow Case. 8, Arrow Rocket. 9, Sword. 10, Section of Bow: *a*, buffalo horn, *b*, bamboo, *c*, layer of cowhide, fastened together by a very insoluble glue.

FIG. 25.

Shooting with the Bow on Horseback.

FIG. 26.



Cross Bow.

FIG. 30.

Chinese Short Sword.

FIG 27.

Imitation Foreign Soldier.

FIG. 28.

Chinese Soldier armed with Minié Rifle.

FIG. 29.

Costume of Chinese Officer.

or let anything occur to arouse his suspicion, and he becomes an unsafe and untrustworthy agent.

In conclusion, let us see what is the present position of the Chinese empire as to its military organization? We have seen the miserable condition of the equipment of their army up to 1860, which they themselves have acknowledged, by showing a desire for adopting the equipment, and the drill in use by us. Their efforts might have been more energetic, as the importance of army re-organization, as an element of governing their own people, no less than as a defence from foreign aggression, must be easily seen by the existence of desolating rebellions in nearly all the provinces, while foreign nations are making repeated encroachments on their continent. But what do we find? The men who were drilled with so much trouble and anxiety are not paid. They go over to the rebels, and take their arms with them. The old commandants have sufficient influence to make the modern drill be treated with indifference, and to preserve their old customs and equipment. The rebellion has been subdued in the central provinces by the aid of foreigners; and the Taeping strongholds, including Nankin, the ancient capital of the empire, which had fallen into their hands, have been re-captured, but rebellion continues rife in other localities, and even now large armies are in the field. A governor of a province, for whom the suppression of rebellion is a plea, who maintains a large army instructed in foreign drill, equipped with foreign muskets and rifles, and what is far more important, having an efficient artillery under foreign officers, and a means of supplying it to any extent with modern ammunition from a well arranged laboratory, is at this present moment in a stronger position than the central Government itself; he being able to make the great revolution in army organization, which the central Government cannot do on account of the trammels of ancient institutions, prejudices, and interests, which hamper all its movements. The opportunity cannot be far distant for a man in Lee Fu Tai's position to show the central Government of Pekin its utter helplessness, and make it yield to his ambition, and the history of China may again record one of those dynastic changes which have so frequently occurred before.

Evening Meeting.

Wednesday, May 1st, 1867.

CAPTAIN E. GARDINER FISHBOURNE, R.N., C.B., in the Chair.

NAMES of MEMBERS who joined the Institution between April 29th and May 1st, 1867.

ANNUAL.

Wells, Richard, Captain R.N. 1*l.*
Harington, Richard H., Comr. R.N. 1*l.*
Comber, H. William, Comr. R.N. 1*l.*
Cottam, Geo. F., Comr. R.N. 1*l.*

THE TURRET *versus* THE BROADSIDE SYSTEM.

By Captain COWPER P. COLES, R.N., C.B.

WHILST endeavouring to explain my views upon a question that all interested in upholding our maritime power are so deeply concerned in, I feel you will grant me your kind indulgence and a patient hearing, remembering the ordeal that my invention has already gone through.

The title of my lecture, "The Turret *versus* the Broadside System," may appear somewhat out of date, since it is now generally admitted that the turret principle for fighting purposes is the right thing, and it only remains to be decided *which* is the best description and class of vessel for carrying and fighting these turrets under all circumstances for the protection of our country, of her vast commerce, and of her colonies.

I intend, 1stly, to give an outline of the various vessels proposed by me since 1855, and those built or building on my principle.

2ndly. To show the advantage of the turret system.

3rdly. The further conclusions I have arrived at, showing the type of vessel I now propose, in order to meet the demands of the increased and still growing power of ordnance.

Description of Diagrams.

With the assistance of these diagrams I will endeavour to give an outline of the peculiarities of these vessels, dealing with them above water only, for supposing the form of ship's bottom to be good for either broadside or turret ship, I will allow it to be common to both, remarking that I consider it indispensable for fighting vessels to have either twin screws or the hydraulic propeller, for which we are indebted to Admiral Elliot. The means of propulsion by two separate powers

Vol II

Fig. 1.

STEAM RAFT. - 1855.

Fig. 2.

CUPOLA SHIP. - 1859.

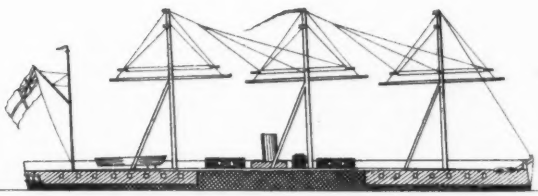
The portions shaded thus ▬ *a*
The portions shaded thus ▨ *a*

Fig. 3.

ROYAL SOVEREIGN.–1862.

Fig. 4.

TURRET SHIP.–1862.



us ■ *are protected by Armour.*
us ▨ *are unprotected.*

J. Jobbins

enables the vessels to turn on their own centre, and thus meets to a very great extent the objection to length.

Fig. 1 (Plate xxxi) is the steam raft proposed by me when up the Black Sea in 1855, for attacking the forts of Sebastopol and Cronstadt; she was to be 150 feet long, only 20 inches out of water, and to carry one 68-pounder, protected by a fixed hemispherical shield of iron.

From my experience with the "Lady Nancy" raft up the sea of Azoff, I was convinced that low freeboard with central armament had great advantages for fighting.

This led to cupola ship, Fig. 2, in 1859, of the same tonnage as "Warrior," carrying nine cupolas with eighteen of the heaviest breech-loaders of that day; the bow and stern cupolas were placed diagonally, and raised somewhat higher than the others, so as to bring four guns right ahead and astern.

Admiral Halsted, a great authority in these matters, is now strongly advocating this plan.

Fig. 3 is the "Royal Sovereign." She and another vessel, the "Prince Albert," were commenced in April, 1862.

At this time the 12-ton gun was tried at Shoeburyness, against the "Warrior" target, when the shot went through it. In consequence I at once applied to the Admiralty to be allowed to provide for two heavy guns in each turret, but they then thought it impracticable to work these heavy guns afloat. However, by perseverance and a compromise of *one* gun for *two* in the turrets, I succeeded at last in getting these two ships armed entirely with 12-ton guns. But it was *eight* months before I obtained permission to fit the "Royal Sovereign," and *one* year and *nine* months, the "Prince Albert." Thus much time was lost, extra expense incurred, and the ships rendered less effective than they would have been had my views been at first favourably considered. The "Royal Sovereign" has now *three* single and *one* double turret, carrying *five* guns; she should have had *three* double turrets and *six* guns.

The "Prince Albert" has *four* single turrets and *four* guns; she should have had *three* double turrets and *six* guns.

The "Royal Sovereign" would thus have had one gun more with 113 tons to spare, and the "Prince Albert" two guns more, with 45 tons to spare, which in both cases would have given increased room and accommodation. These are very formidable vessels, and would destroy any ships of their own tonnage; but should be fitted with hurricane decks, when they would be efficient for any emergency.

The "Royal Sovereign" was first tried in 1864, under the command of Captain Sherard Osborn. It would be presumptuous in me to remark on the very severe tests to which the turrets and their guns and appliances were subjected by that experienced and unprejudiced officer on that occasion, but I am sure all who know the circumstances will agree that the country is much indebted to him for his report, which to this day remains uncontroverted.

§. 9 of the report says:—

"To recapitulate, I am of opinion that the 'Royal Sovereign,' as she now stands, is the most formidable vessel of war I have ever been on board of. She

would easily destroy, if her guns were rifled, any of our present iron-clads, whether of the 'Warrior,' 'Hector,' or 'Research' class. Her handiness, speed, weight of broadside, and the small target she offers, increase tenfold her powers of assault and retreat; and I believe I see my way to firing, by night, from a turret with as much accuracy, as by day, so long as the enemy is visible."

§ 11:—

"Vessels like the 'Royal Sovereign' are admirably calculated for the defence of the coasts, harbours, and roadsteads of Great Britain. With twelve such converted vessels, the fleet might be sent abroad to fight an enemy, and we could feel secure at home come what might, the more so as any naval officer would undertake to work and fight these vessels if manned by artillerymen, with only a dozen sailors to steer and take the lead."

So wrote Captain Osborne in 1864.

In 1862 I proposed Fig. 4, a sea-going vessel, with a belt and square central box, carrying two turrets.

Another vessel on this plan was, in conjunction with me, designed by Mr. Barnaby, of the Controller's Office, in 1863, 280 feet long, 3,700 tons burthen, 24 feet draught of water, and 10 feet free board; had two turrets carrying four 300-pounders, 4½ inch plating, and "Warrior' backing, with a speed of 12½ knots, fully rigged with tripod masts, and spread 28,000 square feet of canvas. She would have been a formidable vessel, capable of cruising to all parts of the world, and have fully tested what a sea-going turret-ship could do. But the anti-turret party—and in using that phrase for convenience and in all good humour, I trust I need hardly disclaim the intention of reflecting upon any one—the anti-turret party were then too strong to admit of a fair trial of a sea-going turret-ship being made.

Fig. 5 (Plate xxxii). This arrangement of armour was proposed in 1863, and alternatives again in 1865. The portion coloured red in all these diagrams is unprotected, and may be riddled by shot without affecting the safety or efficiency of the vessels. That portion painted black is protected by armour. This vessel has a belt, the turrets being carried on the upper deck, and two methods are shown here for protecting the pivot, the after one being carried down through a small circular casing and worked on the lower deck. The foremost turret is supported by and worked in a circular bulkhead, admitting of the turrets being placed at the most convenient distance apart. I have several modifications of these alternatives, which are commendable for small, light vessels, or should a high free board be thought desirable for any special purpose. In the unprotected portion of this ship might be carried a few broadside guns, for signal guns or exercise, and to "teach the young idea how to shoot." She would be a very roomy vessel for carrying troops if required.

Fig. 6 shows the "Huascar" class of 1865 fitted with a hurricane deck; she is one of six different classes designed and built by Messrs. Laird Brothers, to whom the credit for their great success is due. She can fire right ahead from her 300-pounders, and aft within 15 degrees of the line of keel, but would have a stern chaser either on or under her poop.

Three of Messrs. Laird's vessels crossed the Atlantic early in 1866, and they deserve special notice.

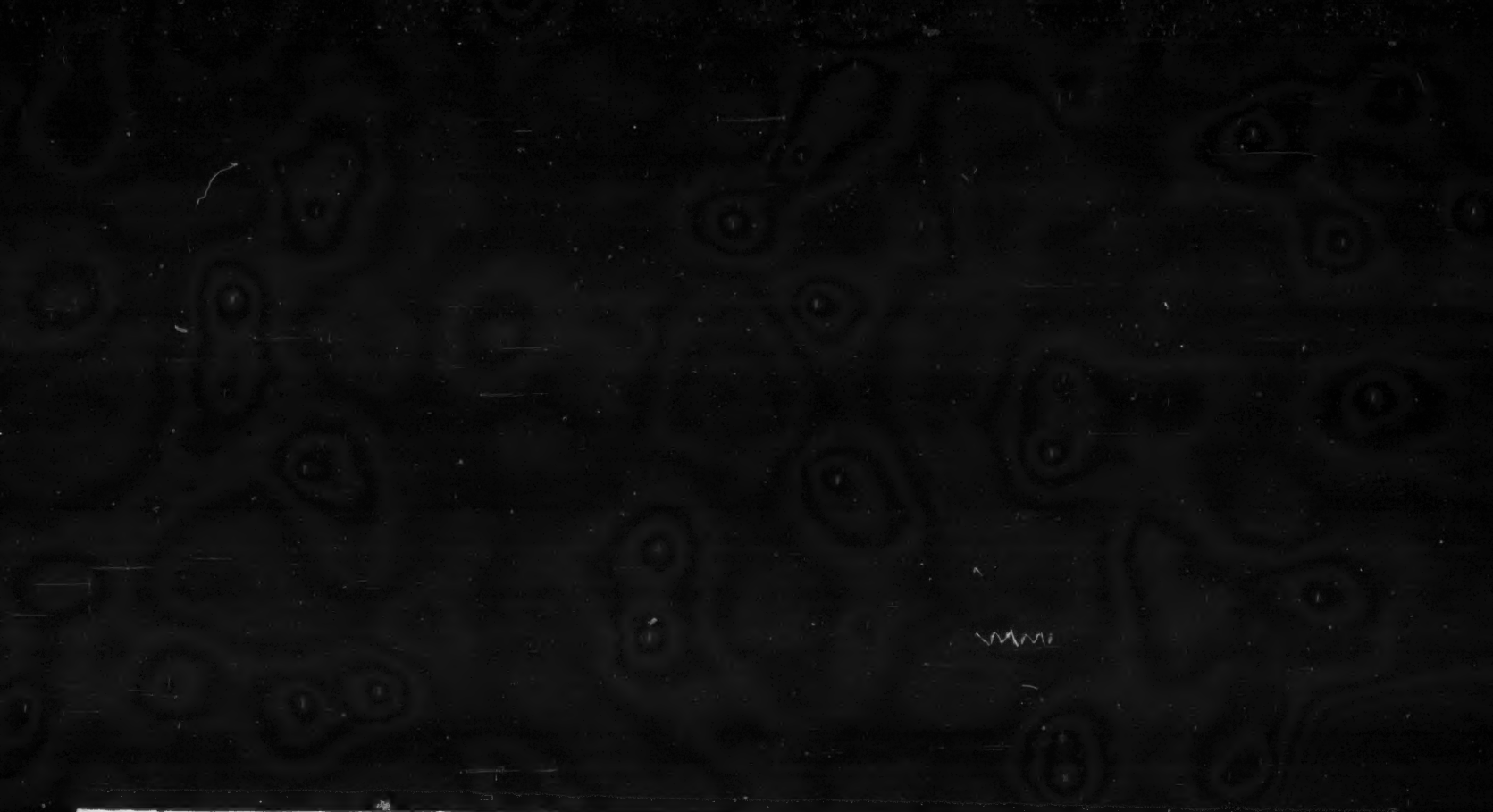


Fig. 5.

ALTERNATIVES. – 1863 & 1865.

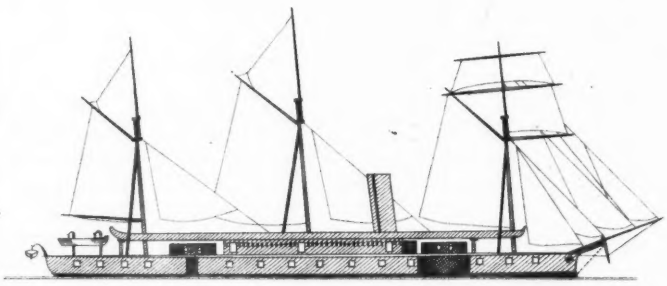


Fig. 6.

HUASCAR CLASS.-1865.

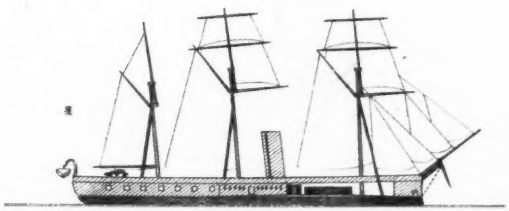


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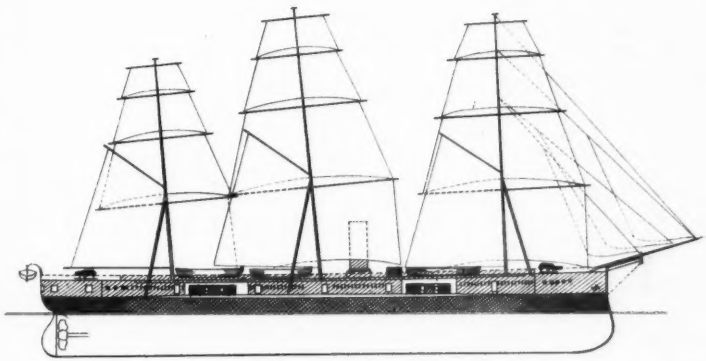
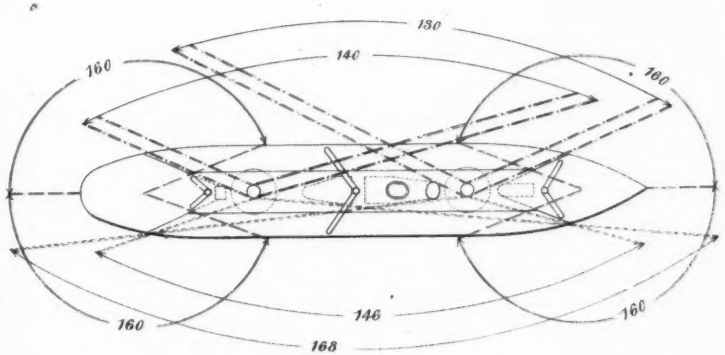
Fig. 7.

CAPTAIN.-1866.



ANGLES OF TRAINING.



are protected by Armour.
are unprotected.

J. Jobbins

1st. The "Huascar," a sea-going vessel of 1,100 tons, 300-horse power, and a speed of 12¼ knots; her foremast is fitted with tripods; she carries *two* 300-pounders in *one* turret. She made an excellent passage to Rio de Janeiro, and experienced more than one heavy gale on her further voyage to Peru. Her companion, a broadside ironclad of 3,000 tons, and *high* out of the water, made much worse weather of it, arriving at Valparaiso one day after her.

2nd. The "Bahia," twin screw vessel of 1,000 tons, 140-horse power, has a speed of 10½ knots, and carries two 150 pounders in one turret. She averaged nearly nine knots on her passage to Rio, and has since been in action on the Paraguayan River, when she was struck by *thirty-nine* 68-pounders.

On that occasion the "Bahia" (turret) and "Tamandaré)" (broadside) went into action together on the Brazilian side, and the official report of the Brazilian Admiral says:—

"The iron-clads 'Bahia' and 'Tamandaré' approached the Flat to silence it. The Flat continued to fire on the ironclads, and two balls entering the square box of the 'Tamandaré,' placed 34 men *hors de combat*, 10 being killed and 24 wounded, in the greater part severely.

"The 'Bahia' took position near the fort, and her first shots broke the Paraguayan cannon.

"The ironclad 'Barroso,' which likewise went to destroy the Flat, had 6 men severely wounded, all in her square box.

"The 'Monitor Bahia' (late 'Minerva,' of Liverpool) has no casualties reported except the wounding of the Commodore while outside the turret.

"These two vessels were struck respectively by 20 and 39 68-pounder balls at short range."

3rd. The "Bellona," twin screw vessel of 1,340 tons, with two turrets, averaged 9½ knots from Liverpool to Rio de Janeiro.

Messrs. Laird Brothers may well be proud of these little vessels; and with my views, I may be permitted, I trust, to express my regret that we should be spending money so freely upon square boxes and all sorts of broadside devices, whilst we do not try even one or two such vessels for our Navy, which class of vessels I believe would be found the most useful and economical for this country to possess.

Fig. 7 is the "Captain," designed by Messrs. Laird Brothers in conjunction with me during the beginning of 1866.

An anonymous pamphlet, which has been quoted in the House of Lords, purporting to explain the reasons for discouraging the development of the turret system from 1860 to 1866, says:—

"This vessel will be equal in tonnage to the 'Bellerophon,' and, therefore, the expectation of a small powerful turret-vessel is doomed to disappointment."

The small iron-clads which I have just described would alone furnish an answer to this erroneous statement.

I will now compare the "Bellerophon" and the "Captain," and I think those who know what fighting ships ought to be, will not, as regards the "Captain," be "*doomed to disappointment.*" The "Captain" has the same tonnage as the "Bellerophon," with 3 feet less beam; she has twin screws, draws 3 feet 6 inches less water, and her speed is estimated at 14 knots. Admitting that the "Captain's" speed will be

equal to that of the "Achilles," we must consider what the speed of the "Bellerophon" is. She has been officially reported as having attained 14 knots at the measured mile. Such results we know to be of an unreliable character, and one cannot but inquire how it is that the "Achilles," of the same estimated speed, beat her when trying together at the rate of two miles an hour, and that she could not even steam away from the "Caledonia" or "Ocean." I confidently hope that the speed of the "Captain" will be not less than that of the "Achilles," and therefore decidedly superior to that of the "Bellerophon" at sea.

The "Captain" is of 900-horse power, stows 610 tons of coal in her bunkers, and could stow, if required, in a compartment between the turret-rooms 491 tons more, making 1,100 tons of coal in all.

The "Bellerophon" is of 1,000-horse power, and stows 500 tons of coal, shewing a far greater consumption of fuel in proportion to quantity carried. The maximum thickness of armour plating on "Bellerophon's" side is 6 inches, on the "Captain" it is 8 inches, and 10 inches on the turrets. The height of guns out of water is the same; but the "Captain" has a fighting power of broadside of four 600-pounders against the "Bellerophon's" five 300-pounders.

Thus as the "Captain" throws more than half more weight of broadside and is protected by one-half more thickness of armour I think there can be little doubt as to which ship would sink the other. The "Captain's" 600 pounders have a range on each broadside of 132 degrees for *both* guns, and of 168 degrees for *single* guns; she can bring her 600 pounders to fire six degrees from the line of keel, and carries bow and stern chase pivot-guns on the poop and forecastle; whilst the "Bellerophon's" maximum training on the broadside is at most 30 degrees each way, 60 degrees in all.

The ventilation, accommodation, and sanitary arrangements in this vessel (see Fig. 10, plate xxxvi) will be better than those in any ironclad built, and equal to those of any unarmoured vessel. Her poop and forecastle are connected by a spacious spar or hurricane deck—24 feet broad—on the same principle as those of the Cunard packets, which cross the Atlantic in all seasons. The hatchways round the funnel and amidships are of iron, and carried up to the spar deck, forming at once a support and a complete system of ventilation to all parts of the ship. Doors are fitted in the iron bulkheading, to give access to the main or turret deck, which in bad weather may be closed, leaving open the hatchways in the poop, forecastle, and spar deck, which is 18 feet above water. There is ample accommodation for an Admiral and his staff, with several spare cabins, baths, and every comfort both for officers and men; her complement will be 400, but she has ample messing room for 610 men besides officers. It will be hardly necessary to point out that this vessel was designed to meet the *comforts* considered necessary for long cruises in peace time, either under sail or steam, combining with these greater fighting powers than any vessel of her tonnage.

Looking at these two vessels in a financial point of view, I find from the Parliamentary return at starting, that the "Bellerophon" in

Fig. 8.

TURRET SHIP. - 1867.

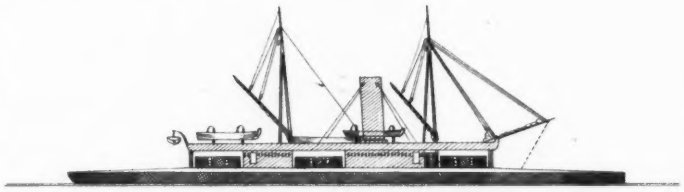


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Fig. 12. TURRET.

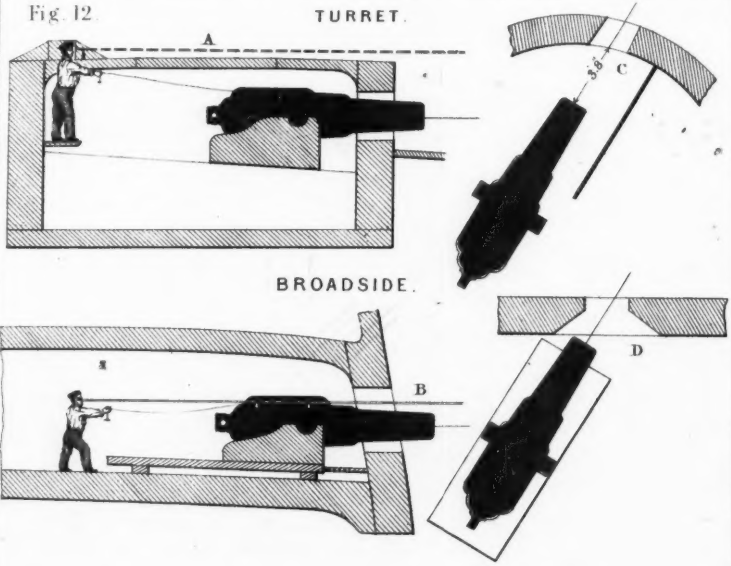
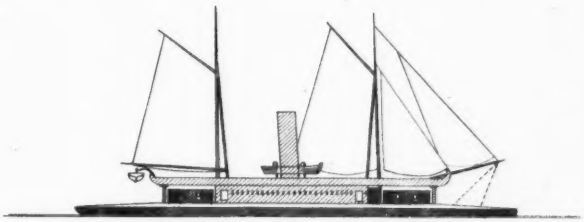


Fig. 9.

IMPROVED PRINCE ALBERT. - 1867.



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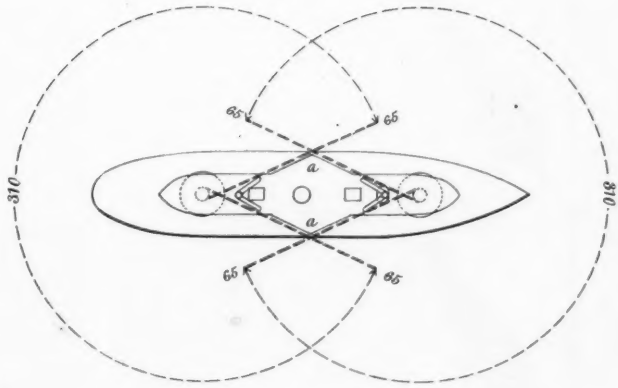


a. a. Deck House.

J. Jobbins.

July, 1866, had already stood the country in £430,495. The tender for the "Captain" is £335,000, leaving a margin in her favour of £95,495. However the accounts are not yet completed. On the other hand the expense of fitting out the "Captain" for sea is not included in the estimate. Again the "Bellerophon" has a complement of 556 men—the "Captain" of 400, making a saving of 156 men, and of £11,585 per annum, with a more efficient war ship.

Fig. 8 (Plate xxxiii) represents a vessel of the same dimensions as the "Captain," having four instead of eight feet freeboard, with no poop or forecastle, but a hurricane deck, 200 feet long. The weight thus gained admits of her having 15-inch armour on her turrets, and 13 inches on her side, or a *third* turret and not so great an increase of armour. She would have the advantage of an all-round-fire from her 600-pounders, crossing at 65 or 75 degrees on the beam, and carrying her guns 11 feet above water.

Fig. 9, a smaller vessel, is an improved "Prince Albert," carrying four 600-pounders in two turrets, and heavy armour.

Small and most formidable vessels could be built on this plan, and it remains to be seen whether they will not be more efficient than those with higher freeboard, and yet be comfortable.

20 *Vessels Built and Building.*

I will not tire my audience by reading over the names of 20 ships built or building in Europe on my plan (see list in Appendix), varying from 1,000 up to 4,000 tons, but will name a few.

The "Rolfe Krake," "Scorpion," and "Wyvern" head the list. They were designed about the same time by their respective eminent builders, Messrs. Napier and Messrs. Laird Brothers.

The "Rolfe Krake" was launched in May, 1863—she has been afloat ever since—did good service in the Danish war, and fully realized my expectations.

The "Scorpion" and "Wyvern" were unfortunately seized by our Government, and not tried until the Autumn of 1865.

Some of the most essential recommendations made by me, as well as by their Captains, in order to adapt them for our Navy as sea-going ships, were not carried out, and consequently they have never had fair play.

In this list, besides the "Smertch," of 1,200 tons, will be found six other formidable Russian vessels. They vary from 1,626 up to 2,170 tons, carrying from two to three turrets, with two 300-pounder breech-loaders in each. I will dwell no more on these 20 specimens, beyond telling you that their aggregate tonnage, leaving out the "Monarch," is 16,204 tons, with a weight of broadside of 12,000 lbs., and requiring 1,392 men to man them.

It has been asserted that there is no great economy in turret ships, but I ask any one to produce the same amount of broadside tonnage that could compete with these 19 ships. To produce the same power of broadside, viz., 12,000 lbs., as thrown by these turret-ships, the

broadside system would require 36,000 tons of shipping, shewing an increased expense for their construction, of £1,572,782, besides necessitating a greater consumption of fuel, and a greater number of men, amounting to 3,124 more, costing £238,539 per annum.

It may be said that it would be impolitic to reduce the number of men we keep up in the Navy, but at all events *now* that men are becoming yearly more expensive and scarce, it appears to me to be of the greatest importance that we should be able to man *more* ships with *fewer* men.

Area of Ports.

I will now explain some of the advantages possessed by guns mounted in a turret.

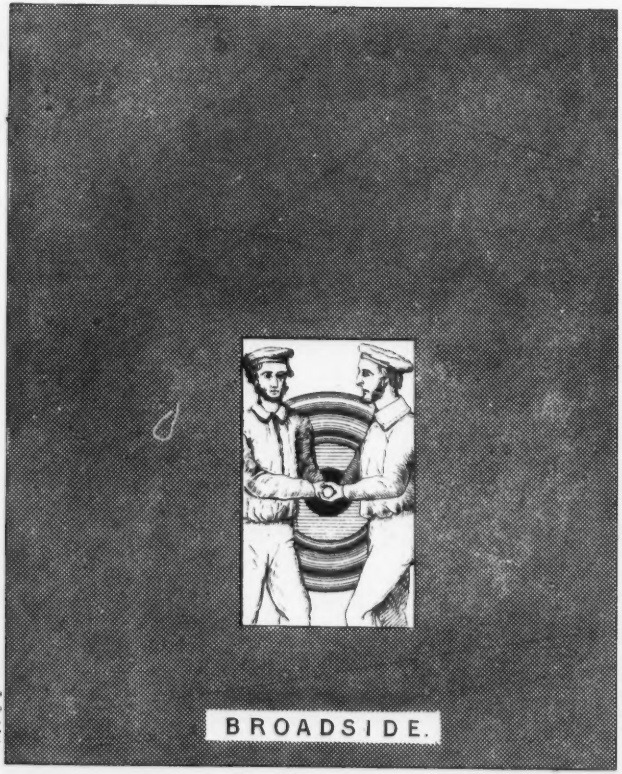
This transparency (see Fig. 11, plate xxxiv) shows the respective open area of a broadside and turret port for a 300-pounder.

It will be noticed that there is an open space between the top of the turret and the hurricane deck, whilst the broadside is continuous to whatever height the upper deck is carried.

The muzzles of the guns when run out fill up a portion of the ports, but the increasing circumference of these guns towards the trunnions closes the interior of the turret port so that it cannot be seen through, hence arose my idea of taking aim by sights placed on the top of the turret, one of the greatest advantages inherent in my system. I have three sights on the top of each turret in case of one being damaged, but space only admits of two being represented in the diagram. It will be seen that the gunner's head, when taking aim, is protected by a circular disc (*a*), as well as by the hurricane deck (*b b*) over the turret, which prevents his being seen or picked off by riflemen from aloft. The sights are placed in a line with the axis of the bore, some 9 or 10 feet apart, and the gunner's eye is close to the rear sight (see Fig. 12A, plate xxxiii); he has a clear range of vision through the aperture, but if needs be, he can look over the top of the disc, and search the whole horizon for his enemy; this arrangement is found of great value when objects are moving.

In a broadside ship the captain of the gun has to take aim through the port, his range of vision is confined to that area (see Fig. 12B), and in general he has to depend upon a message from the upper deck, as to where about the enemy is. The sights are only some 3 or 4 feet apart, which disadvantage is increased by the necessity of his standing 14 or 15 feet from the port, and a great distance from the sights (see diagram). In proportion as the gun is trained or elevated, this inconvenience is greatly exaggerated by his area of vision being decreased, besides his having to move about right and left to search for the object, causing unsteadiness and delay.

We will now suppose both guns fired and run in, when the men step up to load; it will be seen how much more exposed they are in the broadside than in the turret. But the turret port at the instant of firing can be turned away from the enemy's fire, and is thus practically closed in seven seconds, and secured from the chance of the enemy's



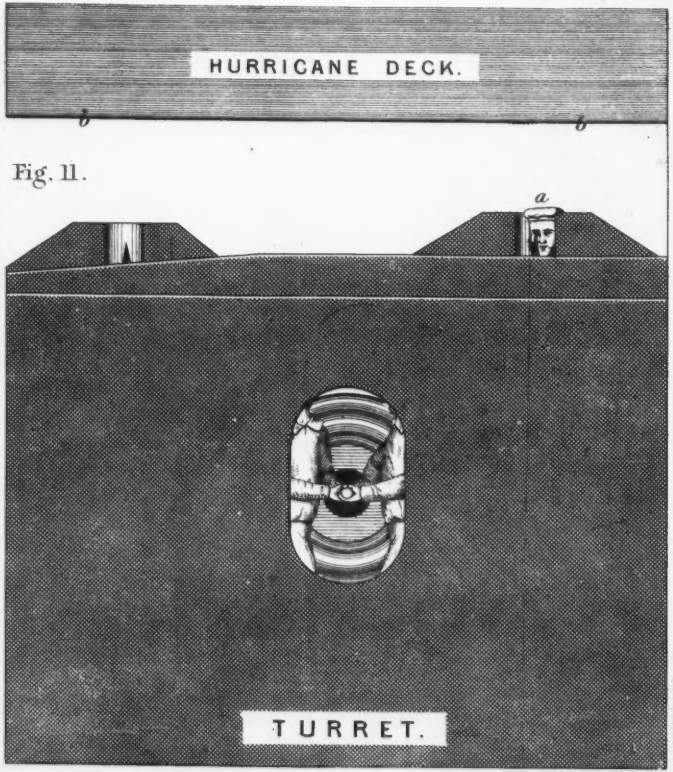


Fig. 11.

missiles entering in fifteen seconds, when it will have been trained 90 degrees

During this time the loaders in the broadside are entirely exposed, and in the American War, guns were prevented from being loaded by riflemen, one instance I will quote, viz., the "Arkansas," ironclad, when passing the United States gunboat, "Scrota." The Lieutenant in command of her officially reports (see page 344).

"At the same time I opened a brisk fire with all my small arms against his ports, which, I am confident prevented them from manning her port guns till after she had passed us.

"I observed one man, in the act of sponging, tumble out of the port, sponge and all, evidently shot by a rifle ball."*

Under the most favourable circumstances even shot of 300-pound weight are no joke to handle; another reason why the turret-gun is more easily loaded than the broadside, is that the muzzle of a turret-gun is 3ft. 8in. from the side of the turret, when in for loading (see Fig. 12C); the broadside gun is not more than six inches in (see Fig. 12D), and this defect becomes still greater when the gun is trained, for the loaders can only stand on one side the muzzle, and are obliged to crouch into the port to load at all. The gun and port in a turret being constant to each other, however much the gun is trained, the space for loading is always the same, also enabling you to have apparatus for loading and hoisting these heavy shot up to the muzzle of the gun, a difficult thing to manage on the broadside.

We will now suppose a minute and a half to have elapsed whilst both guns were being loaded. The turret is revolved on the object, whilst the gun is being run out, and supposing both guns are again run out, you will have observed that the broadside port will have been facing the enemy, entirely open to the entry of shot or shell during the whole period, whilst the turret port will only have been but partially exposed for at most 30 seconds, and fronting the enemy only when firing.

We will take, for instance, the "Bellerophon," with five ports of a side, and supposing 60 rounds to be fired at the rate of one round in a minute and a half, she would have 59 superficial feet of open port-hole exposed to the enemy's fire for an hour and a half. Whilst the turret-ship with an equal number of ports, and firing an equal number of rounds in the same time, would only have 24 superficial feet of open port *partially* exposed to the enemy's fire for 30 minutes, leaving the chances of shot entering the "Bellerophon's" ports seven times greater than that of the turret. However, it may be said, what need to fire into the ports now that Palliser's shells have penetrated ironclads' targets at *right angles*? true, but as we know the chances of penetration decrease in proportion to the incline of surface presented by the armour, and the broadside ship must keep herself nearly broadside on to fight her guns, the open port and greater area of flat surface presented at a right angle will both tell much against her, whilst

* Now that breech-loading small arms are becoming universal, I believe loading these guns at close quarters will be impossible with open ports.—C.P.C.

the turret-ship can fight all her guns at an angle of 60°. I think there can be no comparison as to the great advantage the turret would have on these points, and I feel convinced that all practical seamen gunners will agree when I say that, supposing all other points to be equal, this would be sufficient to decide the fate of any action.

The great precision and *rapidity* of fire that the turret-gun must have over the broadside in actual practice of heavy ordnance, if even tested by competitive firing, will amount to a greater superiority than was experienced with the 40 pounders in the "Trusty," which Captain Powell thus reported of in 1861.

"The cupola gun beats the gun between decks in every description of firing, but it shows its decided superiority when the object is moving, or the ship veering about. I think their Lordships will find that twelve rounds were fired at different targets in a quicker time than as ever before been recorded."

He summed up the advantages as follows:—

"1. Great accuracy of practice, which may be attributed to the facility with which the sights are got on the object.

"The ease, quickness, and precision of training, and the captain of the gun giving his undivided attention to pointing.

"2. The rapidity of fire, particularly at a moving object.

"3. The quickness with which smoke clears away from the sights, with the slightest air.

"4. The large angle of training, which may be taken at between ten and eleven points. This not only gives a greater opportunity of firing, but allows a ship with shield guns to present her bow to the enemy, thus presenting a smaller surface, and at an oblique angle. It also gives the option of putting a ship's head to the sea to steady her.

"5. A perfect system of concentration may be adopted.

"6. The cupola gun requires fewer men generally, and with the exception of three numbers, the crew need not be so highly trained as at other guns.

"7. In the event of explosion, or of the armour plates being driven in, the casualties would be limited to where the accident happens.

"Forming my opinion of it as it is, both in its offensive and defensive capacity, I consider that it is one of the most formidable inventions adapted to naval warfare, as well as coast defences, that has ever come to my notice.

"I have, &c.,

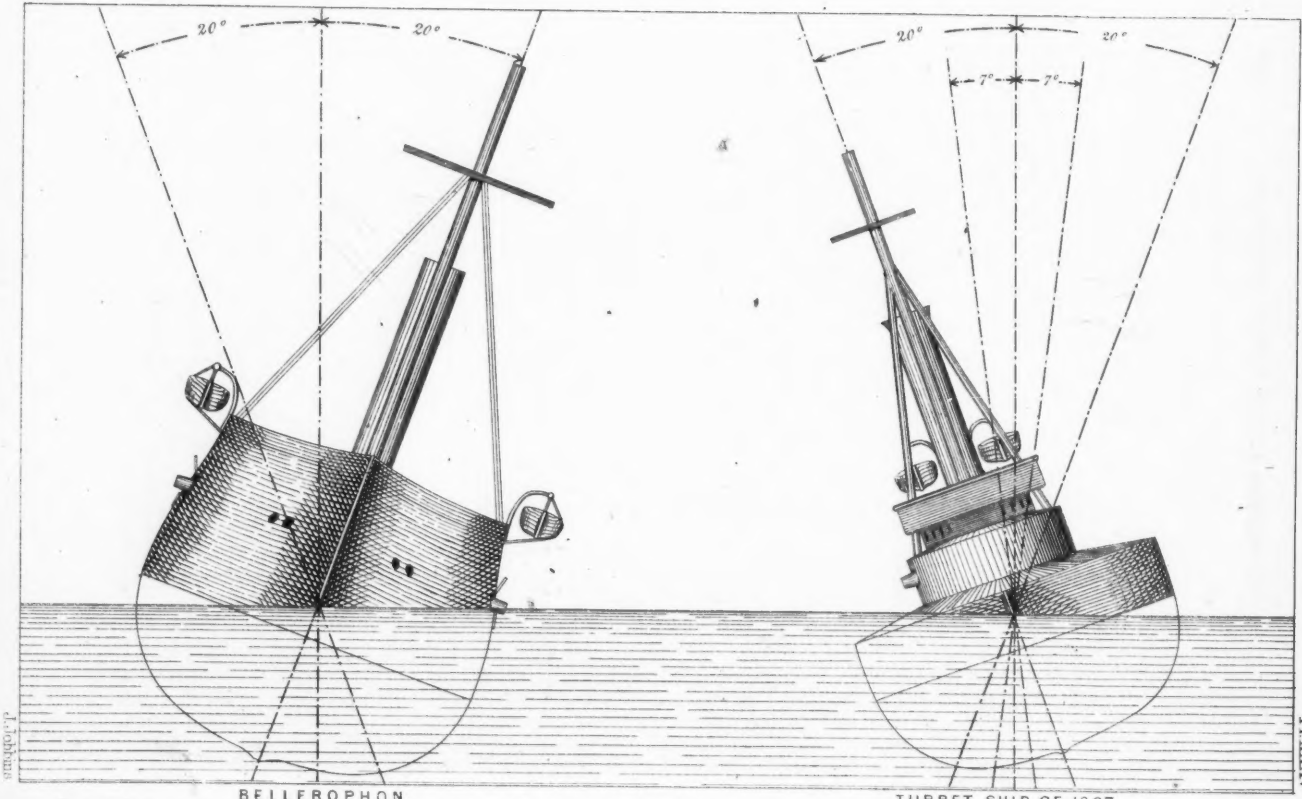
(Signed) "ASHMORE POWELL, Captain, R.N."

So said Captain Powell in 1861.

A Steady Gun Platform.

The next advantage of the turret system that I must deal with is, a steadier gun platform, ensured by lowering the freeboard to the minimum, which is practicable only when adopting the central armament principle. This, with the monster guns now coming into fashion, becomes, above all, the most important point; for, however powerful your ordnance may be, an unsteady gun-platform renders them comparatively useless.

We find a good example in the "Miantonomoh," which vessel, on crossing the Atlantic, rolled 7°; whilst her escorts, broadside vessels, with high freeboard, rolled from 18° to 21°; and we also hear of our broadside



BELLEROPHON

TURRET SHIP OF 1867

ironclads rolling to such an extent, that they roll the shot out of their guns. It is, therefore evident, that supposing vessels equal in all other respects, that with a low freeboard would in a sea-way destroy the broadside ship which, even if she did manage to keep the shot in her guns, would have a sorry chance of hitting the low turret-ship.

Various reasons may be given for the absence of rolling in such turret-ships, but I attribute it mainly to the weights being central, and their lowness of freeboard; for whilst the sea running up a ship's side, or bow, exerts a power to make that ship roll or pitch equal to the height out of water, it is reduced in proportion to the lowness of freeboard, until, taking the extreme of a vessel nearly flush with the water, as in diagram No. 1, of 1855, the sea has little or no effect upon her, but merely washes over her deck, and expends itself, as it were, on a breakwater, enabling, as I shall show, the gun in the central turret to be fought, when one on a broadside ship could not, because the water could not be kept out of the port, and little or no aim could be taken, from the large space through which the muzzle of the gun moves. The great rolling of the broadside iron-clads is too patent to dwell upon, but I am within the mark, when I say that their average rolling is three times greater than that of the "Monitor's."

It will be seen by Fig. 13 (Plate xxxv) that supposing both ships roll 20°, the gun of the broadside ship is buried in the water, whilst that of the turret-ship is free; but this is putting the ship with low freeboard at an undue disadvantage, as the turret-ship with low freeboard only rolls one-third as deep; we will therefore place her at 7°, her extreme roll, and the other at 20°, when you will see how great her advantage will be. Another most serious disadvantage in the deep rolling is, that it exposes the unprotected part of the ship's bottom below the plating, when one unlucky shot might sink her.* It may be reasoned that fighting an action in a heavy swell is an exceptional case; but there is always more or less swell in the Atlantic, and a very little gives these broadside ships sufficient motion to vitiate their aim.

A letter from the "Favourite," a square box iron-clad of 2,000 tons, dated Halifax, May 13th, 1866, says:—

"At 24 hours' notice we were sent off here instead of to the Pacific, we got here in 16½ days, without having experienced a heavy swell, the ship rolls so deep that fighting guns, except in smooth water, would seem to be a difficult matter. Her maximum roll was 25° one way, and 30° the other. We found here the 'Miantonomoh,' during the worst weather they have had, she rolled only 2 or 3 degrees."

So that had the "Favourite" been met by a vessel carrying one 300-pounder on a steady platform, she could have been destroyed with impunity.

Low freeboard and light ends has the same beneficial effect on pitching as rolling, for the sea running up the high bow tends to make it rise, and receding causes the ship to pitch with a heavy jerk or send; but with low freeboard the water breaks over the bow, and

* Admiral Sir Sydney Dacres, I find, points this danger out in his Report on our Ironclad fleet in 1864.—C.P.C.

passes off on either side of the sloped deck, and the vessel being comparatively easy, when steaming head to sea, the screws will be less liable to be lifted out of water; besides, the little resistance which is shown to the sea will give a great advantage in speed.

The Cigar ship is an instance of the advantages of low freeboard. I hear that she rolls but little, neither does the sea ever break on board her; and it is an extraordinary fact that the low freeboard of turret ships, which has been used as an argument against them, now proves to be one of the greatest advantages and reasons for adopting it.

I have no doubt that you have heard of the enormous wave thrown up by the "Bellerophon's" plough bow; her loss of speed in a sea-way argues in favour of low freeboard. She, like other broadside ships, has to carry weight on her bows, to try and get a gun to bear forward beyond the 29 degrees of her broadside ones; but of what use could they be when steaming head to sea, even if they could fight guns in them, which, from the form of the bow, practically could not be done, and the ports must be shut to keep out the water.

It is generally supposed that these turret-ships must be uncomfortable; but when fitted with good and spacious hurricane decks, 18 feet out of the water, my 25 years' experience at sea, in all classes of vessels, tells me that they will be the easiest, and consequently the most comfortable, vessels at sea, with roomy and well-ventilated accommodation below for their less numerous crew. We have the official record that the "Monitors" were the most healthy vessels during the last American war.

I had prepared this paper to explain how abortive it is to place heavy guns in the broadside of ships; by accident the time for reading it was postponed: since then, reports of our iron-clads by two Admirals, both practical seamen, have been published, with the remarks of the Controller of the Navy on them.

They are the first reports published of actual practise at sea with heavy guns on the broadside. Great service has been thus rendered to the country by the Admiralty and the officers who made those unprejudiced reports.

Firstly, Admiral Yelverton says:—

"2. On leaving Portland, September 20th, the wind was fresh from the westward, and had been blowing hard from that quarter for several days; I therefore found a very heavy sea and swell to the westward of the Lizard, so much so, that I decided not to attempt to beat against it, but try the merits of the ships, simply as steamers proceeding under adverse circumstances to a certain point, maintaining a given moderate speed, and preserving, as near as possible, their exact formation in order of steaming, so essentially necessary for the performance of such steam tactics as might be required, had we been in search of an enemy.

"The 'Pallas' and 'Research' were the only two ships that could not keep company with the squadron; the 'Pallas' appeared to plunge heavily, and carried away her jib-boom, but took her place in the squadron the following morning; the 'Research,' from her very small steam power, was out of sight at sunset, and put into Plymouth to fill up with coal.

"37. Gun-drill took place almost daily, and target practice on three occasions, when from either wind or swell, there was a good deal of motion.

"38. The power of working the guns in a heavy sea-way, and also firing at a

target, was only carried out on one occasion, viz., 26th September, when, with view of testing how far the ships placed broadside on to the sea would be able open their ports and take advantage of the few opportunities of seeing their targets that would offer, I ordered 15 shot to be fired at them. I was fully aware of the risk all the ships ran of shipping a large amount of water, for the sea at the time was such that no wooden frigate even would have ventured to open her main-deck ports; but it was an experiment, and, as such, attended with some success, for five guns in each ship were cast loose and fired their three rounds ('Bellerophon' excepted, which fired only two shot), not without difficulty, and shipping a considerable quantity of water, to the destruction of some of the cartridges in the guns.

"39. I may here observe that the 'Caledonia' was rolling 25 degrees in the trough of the sea, and about 10 degrees or 12 degrees when head to it.

"The 'Achilles' appeared to feel it far less than any of the others, and therefore made better practice, though on this occasion she rolled from 15 degrees to 18 degrees.

"40. I do not think that on any future occasion I would venture to open a port or cast a gun loose in any of these ships rolling more than 12 degrees or 15 degrees, for beyond that, the practice would be very doubtful, and the certainty of shipping water very great.

"Placed as the squadron was on the 26th September, a good turret-ship would have been a most formidable adversary, and have done us serious injury."

Secondly, Admiral Warden says :—

"When the signal was made to get up steam and lay out targets, it was necessary to place the ship's head to the sea before it could be considered safe to send the men aloft to furl sails.

"The precaution was then taken of battening down the main-deck hatchways fore and aft, and as the practice was limited to 15 rounds, 5 guns only on the port side were cast loose, and the practice commenced.

"18. It was found utterly out of the question to fire at the target in any other position than when head on to the sea, and the time occupied in firing the prescribed number of rounds was about three-quarters of an hour. It was necessary to steam round the target once or twice to bring the guns to bear when the ship rolled to 28 degrees, whilst it did not exceed 10 or 11 degrees when head to sea. The result was, that the main deck was flooded with water to the extent of flowing over the hatchways, the water poured in and out of the guns, two shot rolled overboard out of them, and one was followed by the cartridge. Two of the guns at different times got the better of the crew, and banged in and out of the port several times with extreme violence, and two of the slides were to a certain extent damaged by it.

"19. It is needless to say that the practice was wild in the extreme, nor do I believe that at any time there was the least probability that we could have hit any enemy's ship, except by accident or miracle. I did not observe any ship, except the 'Achilles,' fire while in the trough of the sea, but she was comparatively quite steady. I have been since informed that the 'Hector' did so likewise. Nor did all the ships fire the prescribed number of rounds, the 'Bellerophon' only two, which shows a manifest desire to get their guns secured again.

"20. The result of that day's experience would seem to prove that it is possible (though certainly never desirable) to cast loose and fire these 7-inch guns in a seaway, either singly or a few at a time, with well-trained men or experienced crews; but under the circumstances of that afternoon I hold that it would have been utterly impossible to have gone to general quarters or fought an enemy's ship.

"21. To have opened all the main-deck ports, judging by the effect of opening only five, would have been to have washed the men away from the guns, and consequently they (the guns) would have taken charge of the deck by getting adrift, but with what consequences it would be utterly impossible to predict.

"The most of the cartridges, if not all of them, would have been destroyed in the guns, and the guns which could have been got off would have hurt nobody. Three

times in the course of that afternoon did the ship roll her main chains right under, and threw the water on the upper deck. The lower sills of the main-deck ports are about 8 feet 6 inches from the water when she is deep, and a roll of 15 degrees just touches the lower sill, and 22 degrees' roll just about covers the whole port (see diagram).

"24. The experience of the practice on the particular day in question leads to the reflection, and to the very important question, 'Could a turret ship of equal 'size and power have done better, or have proved herself more efficient in powers 'of offence and defence?' and I think there are some considerations which would lead to this question being answered in the affirmative. Take the position of this ship first; she would have been utterly unable, as I think I have conclusively shown, to have opened her main-deck ports to fire, unless placed head on to the sea. Her broadside guns train rather more than two points before and abaft the beam, and they are supported on the upper deck by two guns, one on the quarter deck and one on the forecastle, training respectively about 19 degrees before and abaft the beam. It follows, therefore, that if a turret-ship had taken up a position in either bow or quarter of this ship, there would have been a radius of four or five points on either bow or quarter, which would be points of impunity, or she would at the worst only have to contend with one gun. I enclose a diagram which will illustrate my meaning. But further, suppose the turret-ship chose or was obliged to take up a position where the broadside guns of this ship would bear on her when they could be fired, the result would be that the main deck of this ship and the upper deck of the turret would be both flooded alike; but the advantage would, as I think, still remain with the latter. The sea might, and probably would, wash right over the deck of the turret ship, but the water *would be got rid of, whilst here it is not at all clear that it could be got rid of, and certainly not as fast as it would accumulate.*"

Thus say two most distinguished officers, and can anything be more conclusive or corroborative of what I have from time to time stated!

I must first call attention to the fact that, except the *four* 12-ton guns carried by the little "Wyvern," there were only *two* afloat in that squadron; these were on board the "Bellerophon," of 4,000 tons, which, with two ports open, could only manage to fire *two* rounds out of the *fifteen* ordered, and even then, Admiral Yelverton says, "ship-"ping a good deal of water, to the destruction of some of the cartridges "in the guns."

What would have been the result had she opened all her large ports of that area (see Fig. 11), truly, as Admiral Warden says, "the men "would have been *washed* from the guns."

In 1863 I illustrated this awkward position by that diagram, when some of the anti-turret party said it was not a fair illustration; but these reports have proved it only too true. It has been published through various sources, as a set off against the advantages of the turret system, that the broadside could fire *two* rounds to the turret's *one*. I, on the contrary, have always asserted that the broadside could not fight heavy guns efficiently, but that the turret, instead of the broadside, would have the advantage both of quickness and precision in firing.

In consequence of what took place last year, I have been precluded from answering this alleged superiority of the broadside system, and I consoled myself with the old adage "Truth must prevail," which has now come to my rescue. For we find by Admiral Warden's report that the "Lord Clyde," with only 6½-ton guns, fired 15 rounds from

five guns in 45 minutes, or three rounds at the rate of one round in 15 minutes, whilst head to sea, with a roll which did not "exceed 10 or 11 degrees."

The "Royal Sovereign," with defective wooden carriages, fired, according to Captain Key's report of November 7th, 1865, 10 rounds from her two guns in the foremost double turret at the rate of 2 minutes 35 seconds per round, with a maximum roll of from 13 to 15 degrees; and that same day fired 74 rounds with ease at the rate of 2 minutes 16 seconds per round, without mishap; and although the sea came upon her deck, not a bucketful of water came into the turret.

Gentlemen, this is a triumph I must be excused for exulting in, and for taking this opportunity of contradicting the erroneous statements made against fighting turret guns.

Admiral Yelverton says:—

"The turret system of arming a ship would have had a great triumph on this occasion, for there is no doubt that a sea-going turret ship, say 12 or 14 feet out of water, would have fought her guns without the slightest difficulty, and have fired easily six shot to every one from our broadside ships."

The remarks of the Controller on the reports of these sea-going Admirals, deserve notice. They argue in favour of this broadside fleet, and conclude by trying to disparage the advantages which the Admirals consider a *good* turret ship would have. The Controller says, "the sea-going turret-ship has shown as much disposition as her "broadside consorts to roll;" but this remark must be taken with the correction, that no sea-going turret-ship was in company with them, or even possessed by the *British Navy*.

The Controller admits this, for he says:—

"The reports of Admirals Yelverton and Warden confirm, in a marked manner, those, I have from time to time made previous to and since the purchase of the 'Scorpion' and 'Wyvern,' that these ships were totally unfit for cruizing ships."

My published correspondence with the Admiralty in November, 1864, and again in 1865, will show that these vessels were never intended for sea-going cruisers, for I wrote as follows:—

"With reference to the approaching trials of the 'Scorpion' and 'Wyvern,' assisting in the elucidation of these difficulties, I must beg you to remind their Lordships, that I am in no way responsible for those vessels, and would call their attention to the following copy of a letter, dated November 24th, 1864:—

"My dear Lord Clarence Paget,

"The impression from the public journals appears to be gaining ground, that the Birkenhead rams may be considered sea-going turret-ships on my principle; as when I last saw you I pointed out that they do not represent my views, it is hardly necessary for me to do so now; still, as, since they were brought into our service, I have assisted in some points in adapting them to our Navy, I wish you to distinctly understand that the applications of my turret system to sea-going ships can in no way be judged of by the performances of these vessels, for it must be remembered that they have been locked up many months, a long time, in the rapid strides of a new-born invention, and I feel confident Messrs. Laird Brothers would bear me out in saying, that if they were asked to design a sea-going turret ship for the ocean work of our navy she would be a very different description of vessel. These vessels are 1,900 tons, and carry four heavy 12-ton guns on 16 feet draught of water, while

the 'Royal Sovereign' is 3,900 tons, and carries only one gun more on a draught of 26 feet of water.

"The power of carrying such heavy guns into action on so light a draught of water renders these vessels very valuable for an enemy's coast, where light draught of water is essential; but it can hardly be expected that they should be as well adapted for ocean cruising as vessels of larger tonnage and heavier draught of water, in proportion to their armament, if especially designed for this service.

"I am, my Lord,
"Yours faithfully,
"COWPER P. COLES.

"The Right Hon. Lord Clarence Paget,
&c. &c. &c."

"Those vessels were brought into the service for political purposes, and since their purchase, even some most important suggestions made by me for the comfort of the crew, have not been allowed to be carried out. I, therefore, must respectfully protest against those vessels in any way being used, to put off building a sea-going ship, or as an argument against the adaptation of the central armament system to cruisers for our Navy."

After their first cruise, in 1865, from further suggestions made by *their Captains*, I sent in drawings, showing how the poop and forecastle should be connected by a spar or hurricane deck, 13 feet out of the water, on the same principle as those of the Cunard packets, which cross the Atlantic in all seasons, and such as I have described for the "Captain," now building.

These diagrams (Fig. 14, plate xxxvi) are taken from the explanatory drawings enclosed in my letter of November 29th, 1865, in which I said:

"I have thought it right to point out to their Lordships, that these suggestions, made by those officers, will be of the greatest value for sea-going turret-ships."

I must ask you, Gentlemen, to look at these drawings, and hope they will be sufficiently explanatory. I found, however, a year afterwards, from the correspondence presented to the House of Commons, that the Controller's report on my letter and drawing was as follows:—

"Considering the vague terms of Captain Coles's letter and other circumstances to which I have called their Lordships' attention. I do not see that anything else can be done than to acknowledge the receipt of it with thanks, which accordingly I beg leave to submit be done."

Up to this day these improvements have not been made; had they been, these vessels would have been as comfortable at sea as any broadside ironclad of their tonnage, and able to work their guns when these ships could not.

At the same time every improvement and addition (including upper decks) which could be suggested, or which money could procure, have been made to the "Bellerophon," "Pallas," and "Research."

The "Wyvern" was the only vessel carrying a complete armament of 12-ton guns, and her cruising with a squadron of large vessels in the Atlantic in this incomplete state, can only be compared to sending a broadside ironclad to sea without the means of closing her ports. If the "Scorpion" and "Wyvern" when bought into our Navy in 1864 were thought when improved, to be capable of giving the system a fair trial, it would seem obvious that they should at once have been improved and fairly tried. If they were not thought so capable, it would seem

Vol. II.

Fig. 15.

1860

SHIELD SHIP. THREE DECKER.

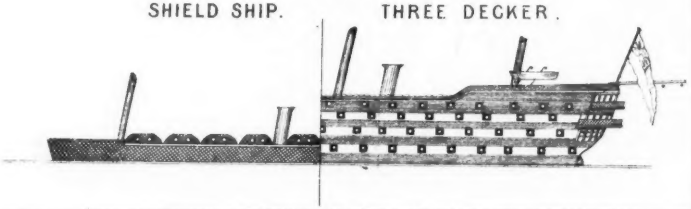
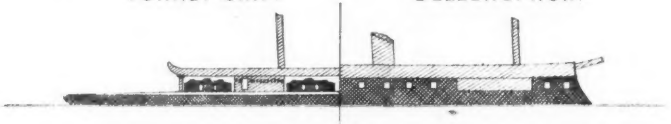


Fig. 16. 1867

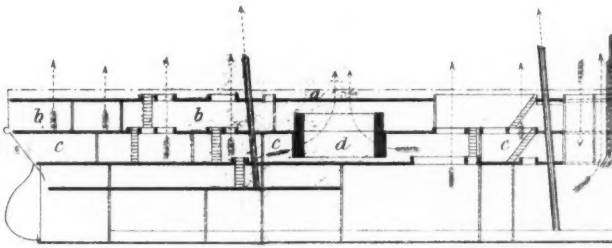
TURRET SHIP. BELLEROPHON.



The parts shaded thus ▬
The parts shaded thus ▨

Fig. 10.

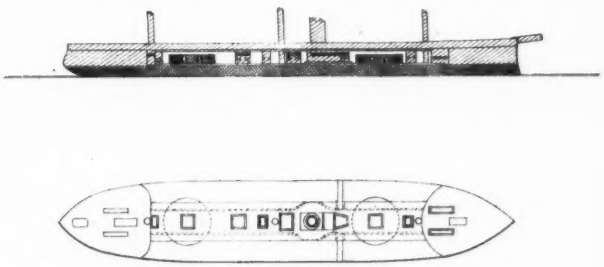
CAPTAIN, ACCOMMODAT



a.a.	*Hurricane D*
b.b.b.b	*Poop and Fo*
c.c.c.c.	*Accommodati*
d.d.	*Turrets.*

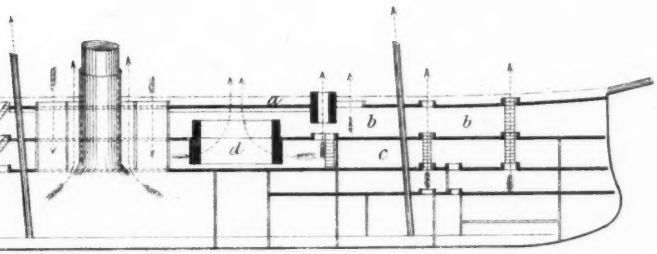
Fig. 14.

WYVERN
WITH HURRICANE DECK ADDED.



thus ▬ *are protected by Armour*
thus ▨ *are unprotected*

OMMODATION & VENTILATION.



rricane Deck.
p and Forecastle.
ommodation for Crew.
rrels.

J. Jobbins

equally obvious that other vessels should have been at once built which *were* capable of affording such a trial. Neither of these courses was taken, but it has happened that vessels of even less tonnage than the "Wyvern," designed by Messrs. Laird, carrying 300-pounders, have crossed the Atlantic, rounded Cape Horn, and proved a great success.

Even looking at the designs that have been from time to time submitted to the Admiralty, the one made by Mr. Barnaby in 1863, on the plan of No. 4, or had any one of the vessels proposed by me been built, we should have had a sea-going ship to compare with, and the information thus gained would have saved millions to the country.

As it is, the little "Wyvern," without the requisite additions, has been used to disparage the favourable conclusions as to the turret system arrived at by both Admirals.

Having thus heard these practical seaman's reports, who will concur in the remark, that these broadside ships "have satisfactorily fulfilled "the purpose for which they were intended?"

It is worthy of notice, too, that whenever there was a head-swell, these shorter ships, with a plough-bow, lost their speed, and when at full speed, with a "*head-swell*," the "Bellerophon" made only 11 knots against the "Achilles'" 13·4 knots, confirming my condemnation of these bows, and the bad proportion of breadth to length in these ships.

The Controller says :—

"Again, except in the turret-ships designed by the Admiralty (designs not approved by the inventor) the nearness of the gun to the water has an important bearing on the probability of striking the object fired at, as the undulations of the sea, even when the ship is rapidly flying past the vertical position, must often completely interpose between the gun and the object aimed at."

I do not know what turret-ship, designed by the Admiralty, is alluded to, unless it is the "Monarch." But, so far as my information extends, she is a burlesque on the turret-system, her guns being 17 feet out of water, with high and weak sides; and I see by the papers that she is fast turning into a square box-ship.

As a rule I have placed the guns in turret-ships, the same height out of water as in broadside ships; the difference being that the turret-gun, being near the centre of the vessel, is further from the water. The "Royal Sovereign's" guns are 12 feet out of water; "Naughty Child's" 10 feet, turret-ship, designed 1863, 13 feet; one turret-ship in 1865, 13 feet; "Captain," building, 11 ft. 6 in., which at once dispels this delusion.

The Controller again says :—

"The conclusion I should draw from these remarks would not be that there is no advantage whatever in a well-designed turret-ship carrying her guns high out of the water under circumstances of heavy rolling, if she were put into a good position in an encounter with a broadside ship, but that these advantages, in such turret-ships as we are acquainted with, are not altogether so great or so decisive as they might appear at first sight."

Again, I say, it is a misfortune that we had no good sea-going turret-ship of any size to try on this occasion. As it is, the evidence

of the Admiral's reports is highly condemnatory of these broadside ships, but strongly in favour of the turret system.

The Controller adds:—

"It seems to me a sound conclusion to draw from these reports, that a naval engagement with ironclads will seldom be attempted, unless in a moderate sea."

I must confess, that I think it may be necessary for a broadside fleet to decline an engagement, except in a moderate sea, but they may not be able to do so: and even in smooth water the aim will be more accurate; the *diminution* of *target* with thicker plating in a turret-ship; the less impediment of *smoke* hanging over and the *greater danger* to a broadside vessel of having her ports fired into with shell; or her thinner side perforated; will give decisive advantages to the turret-ship.

The Controller thus advocates his broadside guns as gallantly as he would fight them if he were in command, but when he is forced by the Admiral's reports to rely on the argument that Naval actions will only be fought *in a moderate sea*, surely it may be said in all good humour that he is reduced to his last cartridge!

It is rumoured, though I do not vouch for it, that when the sea was coming in at the ports of the "Lord Clyde," as I prophesied it would in this room in 1863, the Admiral was on the main deck, and did actually swim for a hatchway! How fortunate it was that it was not our gallant friend the Controller. He, I am convinced, would have stuck to his broadside guns even in that dire extremity! He would have *disdained* the hatchway, and *might* have perished in the waters!

Since these latest specimens of broadside ships have proved themselves so deficient in speed, it shows that the new theory of greater beam in proportion to length is wrong, and that the old and experienced Naval Architect, who designed the "Warrior" and "Achilles," was right. One point I am sure all will agree in, viz., that whatever merits may be possessed by these ships, if they cannot fight their guns, and would be at the mercy of a "*good turret-ship*," they are practically valueless.

Our broadside ironclad fleet has now been built at an enormous cost, and must of course be used, but it is now a very safe prophecy to make, that in a very short time they will be absolutely useless for fighting purposes. If it be true, that waterproof cartridges have now been ordered for the use of these heavy guns in broadside ships, it reminds me of the argument in favour of the old *flint lock*, namely, that you could make a waterproof cover for it. But woe to the country whose fleets have to resort to such measures to try and "*keep their powder dry*."

In looking back to the development of iron-clads and artillery since 1855, it will be observed that the broadside partisans, whilst avoiding the true principle of the turret system, have so far acknowledged the advantages in imitating its fighting powers by poking guns out of broadside ships in all directions, which only complicate their difficulties.

It now remains to consider what is the best type of vessels for our Navy.

My friends may say that I have too many patterns; but I am like a shoemaker, who can make any pattern for special purposes, from a dancing shoe to a waterproof shooting-boot, but sticks to his leather. *Mine is the turret.* I maintain that as a rule, special vessels must be built for special purposes where armour is involved, but that the turntable and shield, which, combined, form my turrets, admit of the construction of war ships, which can serve more general purposes than those built on the broadside principle. For instance, vessels capable of the defence of our shores or colonies, fit for the close attack of an enemy's strongholds; carrying the heaviest cannon that can be manufactured, and yet capable of crossing the widest oceans; can only be found to-day in existing vessels with a low freeboard and turrets. With reference to sea-going cruisers that can house their crews comfortably for long voyages under steam or sail, I point to Fig. 6. The "Huascar" class, from 1,100 up to 1,500 tons, with one or two turrets, working up to the largest class, the "Captain's" size of 4,000 tons (Fig. 7). These vessels will meet every necessity for the comfort of the most luxurious sailors, are seaworthy, and are well adapted to the ordnance of the present day. But as heavy ordnance becomes more general, we must go still further, and come to all sizes of vessels, like Figs. 8 and 9, with 10 or 15 inches of armour, such as are to-day constructed in America. But I hold, and so I presume will all sailors, that a pennyworth of practice is worth any amount of theory on such a subject as the sea-going qualities of vessels with low freeboard. The nation which has put the turret principle to the proof on that head, as well as its fighting powers, declares emphatically in its favour on both points. The following are the words of the American Secretary of the Navy, in his report, dated December, 1866. Alluding to the turreted ships, he says:—

"The impression sought to be created, that these vessels could not venture outside the harbours where they were constructed, or at all events that they could not proceed on a distant voyage, has been dispelled by the cruise of the 'Monadnuck,' which after navigating the Atlantic and Pacific, reached San Francisco in safety. The 'Miantonomoh' has crossed the Atlantic and has traversed the Baltic and Mediterranean. *These vessels have in these two voyages disposed in a great degree of the misrepresentations and prejudices which have been created, and proved the ability of the turreted vessels to perform long voyages when required.*"

The "Monadnuck," in June last, is reported by Admiral Rogers to have been in a very heavy gale, he gives the height of his eye above the level, as well as that of her mast-head light, from which I glean that the storm waves were about 25 feet in height, and he says:—

"In this sea, according to the testimony of her officers, she was very easy while it blew the hardest and the sea was most violent, she twice parted her tiller-ropes in quick succession."

Yet by the aid of her twin screws the ship made excellent weather lying to.

It may justly occur to you all, how is it that the inventor of the turret system has to-day to quote American evidence on the sea-going capacity of vessels fitted on his principle. All I can reply is, that the fault is not mine. It will be two years more before the first sea-going

vessel constructed according to my views will be ready, for I cannot accept the "Monarch" as a fighting turret-ship. Am I unreasonable if I say that, apart from the "Captain," other turret-ships of a smaller class ought to be laid down to test my principle, as against the small class of broadside ships in the character of cruisers. For I cannot too earnestly impress upon you, that I make the fullest distinction between a cruiser, and a vessel merely capable of making a long sea voyage. The cruiser is a ship capable of keeping her crew in health and comfort on the high seas, possessing good steam power but trusting much to her sails.

The other vessels, Fig. 8 or 9, with a very low freeboard, have yet to be tested by our Navy. The "Royal Sovereign" and "Prince Albert" do not illustrate the advantages of the system of a minimum freeboard, and apart from the "Captain," I have been given no opportunities of acquiring by experience and practical tests, proofs of the advantages or defects of these two smaller classes of turreted ships. As an inventor, I may be supposed to be prejudiced, but this I can assure you that what I desire is, to see my inventions put to the severest practical tests, in order, that defects may shew themselves, and I may set to work to remedy them. A fleet of broadside ships have been constructed, with unlimited expenditure, on all possible devices, and the advocates of that system have had vast opportunities of correcting, adding to, and taking away from their original productions, whilst I, as a Naval Officer, have to work it out or trust to the evidence of foreign sailors, that evidence being pooh-poohed in many cases by my countrymen.

Passing from armoured turret-ships, I hold that we must also possess numerous swift unarmoured ships, with heavy guns on turn-tables, for the protection of our commerce, &c.; but all such ships should be built of iron, for every wooden ship is so much money wasted. The armour or the shield may not always be necessary, but the turn-table is, whenever guns of 12 or 20 tons have to be fought efficiently in a sea-way. My opinions as to the value of our wooden line-of-battle ships, recorded in the theatre of this Institution, in 1860, and illustrated by Fig. 15 (Plate xxxvi), have been more than realised, for they are to-day being sold, engines included, for £2 16*s.* per ton, they having cost £25 per ton. I also then pointed out that to plate the large surface necessary to protect broadside guns, with numerous port-holes for the ready entry of shot, shell, and water, would be abortive. What I then said of the wooden line-of-battle ships, I now say of armoured vessels, with their guns ranged along their sides (see Fig. 16); and do you not think, with the evidence before us, that I am justified in my opinion?

Touching the future of the turret system, I am not without hope that its worst days are over. In the first place the Admiralty is now under a rule combining practical knowledge with absence of professional prejudice. I have noticed, since the very remarkable experience of our fleet and that of the French last autumn, that without quite coming round to turrets, there is a disposition to accept the principle, provided some clever men can find a way of doing so without laying

themselves open to the charge of wasting the public funds for the last seven years. The latest thing I have heard of is a semi-turret ship, with high freeboard, and this, I suppose, I ought to accept as evidence of at least a semi-conversion to the principle.

In conclusion it is obvious, I believe, that by lowering the free board to the minimum, the following advantages are obtained, viz.:—

1st. A steadier gun platform, and incidentally less risk of being struck below plating whilst rolling in a seaway, as well as the power of fighting these heavy guns in a seaway.

2nd. Diminution of area to be plated makes smaller vessels and thicker plates practically available.

3rd. Diminution of target and increased thickness of plates both incident to lowering the free board, seem the only effectual means of resisting the advances of modern guns and projectiles.

4th. Less expense in the first outlay to produce these costly ships, since less tonnage is required, and fewer men, making it practicable to man more ships in time of war.

The disadvantages often alleged to be incidental to a low free board, viz., discomfort to the ship's company, is obviated in vessels of every class by means of a hurricane deck, such as I have described in figs. 6, 7, 8, and 9. I would also observe that the recent improvements in guns and projectiles have increased the risk, previously very great to vessels with high free-board and central casemated batteries, from the entering of the shell, either through their large ports, or through their weak sides, and this is a risk which there is no means of obviating in broadside ships.

Disregarding for the moment all other considerations than the comfort of the ship's company, it still seems questionable whether any increased comfort in time of peace from a high free board, is not more than counter-balanced by their greatly increased weakness from the cause I have mentioned, in time of war.

I cannot conclude without endeavouring to express my gratitude to those who have held out the hand of friendship to me throughout such an up-hill struggle.

Allow me to thank you, Ladies and Gentlemen, for your kind and patient hearing through, I fear, a somewhat tedious paper; and it is with great pleasure that I see so many distinguished persons among my audience, but more especially the faces of some fair ladies.

APPENDIX.

COMPARISON BETWEEN "BELLEROPHON," "CAPTAIN," AND "WARRIOR."

	"Bellerophon."	"Captain."	"Warrior."	
Length	300 feet	320 feet	380 feet	
Beam	56 ft. 1 in.	53 feet	58 ft. 4 in.	
Draught of water	26 ft. 6 in.	23 feet	27 ft. 3 in.	
Tonnage	4270	4272	6109	
Horse-power	1000	900	1250	
Speed	14	14½	14	
Iron plating on deck	⅝	1½	⅝	
Whether wholly or partially clad	Partially	Wholly	Partially	
Maximum thickness of armour plating on ship's side	6 in.	8 in.	4½ in.	
Ditto on battery or turret	6 in.	10 in.	4½ in.	
Inner skin	1½ in.	1½	$\frac{9}{16}$ in.	
Height of spar on hurricane deck above water	14 feet	19	17	
Ditto of guns above water	11 feet	11½	10 ft. 7 in.	
Distance of guns horizontally from the sea	0	12	0	
Calibre of guns	300-prs.	600-prs.	100-prs.	
Weight of broadside from guns protected by armour in turrets or battery	1500	2400	1300	
No. of officers and men	556	400	705	In the Navy Estimates of 1865 Lord C. Paget states that the average cost per head of officers and men is £74 5*s.* 3½*d.* a-year; so, as the "Captain" has 156 men less than "Bellerophon," in this item she will cost the country £11,585 2*s.* 3*d.* less per year.
Cost up to July, 1866, as per Parliamentary return (No. 526)	*a.* £430,495	*b.* £335,000*	*c.* £360,995	*This leaves a margin in favour of "Captain" over "Bellerophon" at present of £95,495.

a. This includes share of dockyard, but not armament and other fittings, as accounts are not yet completed; see Parliamentary Return (526).

b. Messrs. Laird's tender for "Captain."

c. It is now admitted that "Bellerophon's" guns are too close. She ought not to have more than four guns of a side in her battery, making her effective broadside only 1,200 lbs., or one-half that of the "Captain's."

COMPARISON BETWEEN "ROYAL SOVEREIGN" AND "PRINCE ALBERT," AS THEY ARE AND AS THEY SHOULD HAVE BEEN.

"ROYAL SOVEREIGN."

As she is with 3 *Single and* 1 *Double Turret, and* 5 *Guns.*

	tons.	cwt.	qrs.	lbs.
After-turret	148	13	0	4
„ next	151	7	1	14
„ next	151	0	3	0
Double „	163	0	3	10
Five guns with carriages (each 14 tons 8 cwt.)	72	0	0	0
	685	2	0	0

The above weights comprise glacis plates, beds, pivots, pillars, and everything appertaining to the turrets.

As she should have been with 3 *Double Turrets and* 6 *Guns.*

	tons.	cwt.	qrs.	lbs.
Three double turrets (each 162 tons 0 cwt. 3 qrs. 10 lbs.)	486	2	2	2
Six guns with carriages (each 14 tons 8 cwt.)	86	8	0	0
Balance of weight to spare	112	11	1	26
	685	2	0	0

"PRINCE ALBERT."

As she is with 4 *Single Turrets and* 4 *Guns.*

	tons.	cwt.	qrs.	lbs.
Four single turrets (at 140 tons each)	560	0	0	0
Four guns with carriages (each 14 ton 8 cwt.)	57	12	0	0
	617	12	0	0

As she should have been with 3 *Double Turrets.*

	tons.	cwt.	qrs.	lbs.
Three double turrets (each 162 tons 0 cwt. 3 qrs. 10 lbs.)	486	2	2	2
Six guns and carriages (each 14 tons. 8 cwt.)	86	8	0	0
Balance of weight to spare	45	1	1	16
	617	12	0	0

Showing that the "Royal Sovereign" would have one more gun, with 112 tons to spare, and the "Prince Albert" two more guns, with 45 tons to spare, which, in both cases, would have given increased room and accommodation.

DESIGNS OF TURRET SHIPS SUBMITTED TO THE ADMIRALTY.

	1. Designed by Controller. "Prince Albert."	2. Drawn out with Mr. Barnaby in Controller's Office.	3. "Naughty Child."	4. Drawn out with Mr. Scullard at Portsmouth.
Date	April, 1862	March, 1863	April 14, 1863	April 3, 1865
Length	240 feet	280 feet	225 feet	225 feet
Breadth	48 feet	54 feet	46 feet	49 feet
Draught of water	20 feet	24 ft. 6 in.	21 ft. 7 in.	22 ft. 6 in.
Tonnage	2,529 tons	3,700 tons	2094 tons	2,409
Horse-power	500	800	400	600
Speed	11	12½	10-8	13-8
Thickness of armour-plating on ships	5½	4½	4½	6
Height of guns out of water	12	13 ft. 6 in.	10 ft. 6 in.	13
Number of turrets	4	4	2	1
Armament as originally designed	12 100-prs.	4 300-prs.	3 300-prs.	2 600-prs.
Ditto as decided	4 300-prs.	,,	,,	,,
Weight of broadside as originally designed	1,200 lbs.	1,200 lbs.	900 lbs.	1,200 lbs.
Ditto as decided	,,	,,	,,	,,
Area of sails in square feet		33,000	20,000	26,620
Whether sea-going or coast defence	Coast	Sea	Sea	Sea
Whether built	Yes	Never	Never	Never

TURRET-SHIPS IN EUROPE ON CAPTAIN COWPER COLES'S PLAN.

Built.	Weight of one broadside protected by armour.	Tonnage.	No. of Men.	Designed and built by
	lbs.			
1. Rolfe Krake.....	272	1246	100	Messrs. Napier (Glasgow).
2. Royal Sovereign	1500	3765	300	Conversion.
3. Scorpion	1200	1833	170	Messrs. Laird Brothers.
4. Wyvern	1200	1833	170	Ditto.
5. Smertch.....	600	1350	100	Messrs. Mitchell.
6. Armenius.....	288	1230	99	Messrs. Samuda.
7. Affondatore.....	600	2306	188	Millwall Iron-works.
8. Huascar	600	1100	83	Messrs. Laird Brothers.
9. Minerva	300	1000	80	Ditto.
10. Bellona.....	600	1330	100	Ditto.
11. Prins Hendrick	1200	2096	200	Ditto.
12. Prince Albert.....	1200	2537	200	Admiralty.
	9560	21626	1790	
Building.				
13. Monarch.....	2400	5100	500	Designed by Admiralty; objected to by Capt. C. Coles.
14. Captain	2400	4272	400	Messrs. Laird Brothers and Captain Cowper Coles.
15. Russian—Charadaca.	1200	1626	136	Russian Government. 2 turrets 4 guns.
16. Ditto Rousalka..	1200	1626	136	Ditto. 2 turrets 4 guns.
17. Ditto Minerve ..	1800	2170	180	Ditto. 2 „ 4 „
18. Ditto Admiral Chickakoff	1800	2170	180	Ditto. 3 „ 6 „
19. Russian — Admiral Speredof.....	1800	2170	180	Ditto. 3 „ 6 „
20. Russian — Admiral Greg	1800	2170	180	Ditto. 3 „ 6 „
	14400	21304	1892	

* There are several now building in France.

The CHAIRMAN: It will be quite impossible to discuss this very important and instructive lecture at this late hour. We propose to adjourn the meeting to-morrow night. But as the discussion will occupy some time, the meeting will commence at eight, instead of half-past. However, as there is a large number of gentlemen present, it would be only fair to the "anti-turret party," if I may use that designation, to give them an opportunity of speaking to the point, although it must necessarily be very short. Mr. Reed will, perhaps, address the meeting.

Mr. E. J. REED, Chief Constructor of the Navy: Mr. Chairman, I am sorry to have to respond to that invitation, and to speak under that form of invitation.

The CHAIRMAN: I apologise for having used the expression.

Mr. REED: I am quite sure that it was spoken conversationally and conventionally.

But I mention it because I think it would be highly improper and in the worst taste for any official person whatever to present himself as an opponent of the turret system. I think I may appeal to Captain Coles to say—if I am considered by himself or by any other gentleman as an opponent of the turret system—that I have not always been so; because it was my good fortune very early to be associated with Captain Coles in claiming public consideration for his invention; and Captain Coles has done me the honour, sometimes with my assent, sometimes without it, to quote remarks of mine in connection with that aspect of the subject, as a supporter of the turret system. I think it is only due to myself to say under the peculiar circumstances of the moment —not of the case—of the moment only, that I have always been a great advocate of the turret system; and that which I have always longed to hear and to see in connection with the turret system is that which I have not been privileged to see and hear on this occasion, namely, a thoroughly impartial advocacy of that system—a setting forth of that system upon grounds which ought to affect and can affect official persons entrusted with the responsibility of building the Navy of England. And I must say that I very much deplore, indeed, that it has been the ill-fate of the turret system from the first to be associated with representations which are not substantiated by fact, but which are attributable to undue enthusiasm on the part of its very able and very honourable advocate. Now, I should only like to refer, as a preliminary indication of his not exceedingly fair method, to that dark gentleman looking through the broadside port. I ask any gentleman, presuming the port to be 4 feet high—and Captain Coles tells us it is—whether that is a man of reasonable stature? My impression is that he is not a fair representative of the British seaman; because from the top of his hat to the soles of his feet he only measures about 4 feet in height. Another more serious departure from what is artistical accuracy, is to be found in the frequent representations put forward this evening touching Her Majesty's ships. Permit me to say here—what I have not had the opportunity of saying before, viz., a few words with regard to the trial of the "Bellerophon," which has been put forward two or three times this evening, and certainly two or three dozen times before by the supporters of the turret system. The report of that unfortunate trial of the "Bellerophon" Captain Coles holds in his hand. It shows that the indicated horse power on that occasion—the first time her own stokers tried to produce a full speed trial—was 4,000 horse-power. Now, I never bargained that the full speed of the "Bellerophon" should be 14 knots, with 4,000 horse power, but with 6,000 horse power. I say you cannot take that as a true test, when the trial was made with one-third less horse-power than the vessel was intended to employ. I am sure I need not, in a meeting like this, of gentlemen who are eminent as naval officers, and many of them eminent at the same time for their capabilities in reference to steam, say that it is not an easy thing in a ship with surface condensers, and super-heaters, and a number of modern devices adopted for a very proper purpose, namely the economising of fuel—it is not fair to expect that her staff of stokers and engineers shall, on the first occasion when they are charged with the duty of obtaining full power, produce that full power. It is the fact, stated on the authority of the captain of the ship, that the ship did on the following day steam her 14 knots with the indicated horse-power which was bargained for. Permit me to say further—and I am very pleased indeed to have the opportunity of saying it in the presence of Captain Coles—that while he has been exceedingly free this evening in his censures on official persons on account of the great delay in building sea-going turret-ships, I am the very person who, two years ago, did advise Captain Coles to build a turret-ship, to accept an offer from the then Board of Admiralty, who offered to build him a ship on the dimensions of the "Bellerophon." Captain Coles then repudiated that idea, scouted it with no great expression of personal respect for myself. He did so on the ground that the ship was a great deal too large. Now, I want to know how it happens that, if two years ago a ship of certain dimensions was too large for Captain Coles's plan when designed by me, he should now accept a design a little larger by Messrs. Laird? Captain Coles will have to account for that circumstance. He will also have to give account for a more serious circumstance, bearing upon a point that he has not alluded to this evening, namely, how it happens, when he is so sensible of leaving ships exposed a very little way below an imaginary water

line, that he has consented to build a ship which has only 5 feet of armour-plate below the water line? Notwithstanding his comparison between the "Captain" and the "Bellerophon," which was a one-sided comparison, in which he left out many considerations, I must say he utterly failed to convey to you why, seeing that the "Bellerophon," built three or four years ago, has her armour extending 6 feet 6 inches below the water—why this vaunted "Captain," which is now building, is to have her armour 5 feet below the water line only, and a single inch thicker only than in the "Bellerophon" in the wake of her engines and boilers. My own conviction is—and I speak it with the greatest possible regard to those many official considerations which weigh upon the minds of the gentlemen who constitute Boards of Admiralty—I say my own feeling is, that it is our duty to make progress, and not to go back; and yet Captain Coles, who has pointed out the importance of the armour being carried low down, has himself consented to accept a design in which the armour descends 5 feet only below the water line, in a ship of more than 4,000 tons. Another point which I should like to refer to is in connection with the cost of the "Bellerophon." I feel placed at a disadvantage in this matter, not so much by Captain Coles, as by a singular, a strange, and a sad conjunction between what I believe to be an excessive Parliamentary activity on the details of ship-building, and an unfortunate yielding of Admiralties to pressure of that nature. The sum which Captain Coles has quoted as the difference between the cost price of the "Captain" and the "Bellerophon," amounting to nearly £100,000, happens to include an item of over £90,000, which does not belong to the "Bellerophon" at all, any more than it does to any other ship constructed in the dockyards. It is a perfectly abstract sum, based upon the cost of our dockyard establishments, and yet that £100,000 has been charged to the cost of the "Bellerophon." I must say it does sound strangely in my ears, when I know that the "Captain" is to cost precisely the same as the "Bellerophon," or very nearly so, and when we know, moreover, that there is some reason to conjecture that the price of the "Captain" has been based upon the price of the "Bellerophon," to hear it said that the one ship cost £100,000 more than the other, because of an arbitrary matter of account which does not enter into the cost of the vessel at all.

The CHAIRMAN: Is not this the charge on the plant, that is added, and which is charged for of course in Mr. Laird's account?

Mr. REED: Permit me to say that the £100,000 includes the cost of chaplains and a thousand other things, which I am not responsible for. It is admitted to be, by persons conversant with the subject, a very arbitrary and a very unfair charge against the cost of the ship.

The CHAIRMAN: This is the plant, and the dockyard expenses. Mr. Laird must pay for his officers who superintend his work, or it would cost more.

Mr. REED: My contention is that the sum is perfectly arbitrary and very excessive. That is my point; the sum included in Captain Coles's figures, is 35 per cent. upon the total cost of materials and labour. There may be gentlemen here who concur in the justice of that charge. I do not myself, and I may be permitted to express my dissent from it. Again, it is a singular circumstance to my mind that Captain Coles should, somehow or other, whether by a clearer insight than I can possibly attain to, or by some other gift, I do not know; but he certainly has the singular capacity of seeing enormous merit in the low free-board of a turret ship at one moment, and yet fails to see altogether the deplorable disadvantages of that low free-board, which are not less evident. Captain Coles has read to you a series of extracts from the reports of the Admirals who commanded the Channel squadron. And Captain Coles has singularly enough quoted a fact, reference to which involves, I believe, some oversight on the part of one of those gallant officers, inasmuch as it is put as a very strong point against the "Bellerophon," that she only fired two shots when the ships were ordered to fire fifteen. Now, the report itself distinctly states that five guns were cast adrift on one of the broadsides, and they fired three shots each. The "Bellerophon" only fired two shots altogether. Why? Because the "Bellerophon" had only one gun on each side! And Captain Coles knows the fact, because he told us later on in another connection, that the "Bellerophon" was the only ship that carried the twelve-ton gun in that squadron. I have

not re-read this report with the care which such important documents deserve; but my impression is, that that fact, that the "Bellerophon" had only one gun on each side was—

Captain SCOTT: I will explain that at the next meeting.

Mr. REED: You will agree with me that it was no serious thing, when the other ships fired three shots per gun, that the "Bellerophon" should only fire two shots with one gun. But what I want to draw attention to is, that Captain Coles has read three paragraphs from Admiral Yelverton's report. He has read a certain paragraph, and he has read a certain sentence which precedes another sentence, and he has read another paragraph and another sentence which succeed that other sentence. But the sentence itself has escaped the notice of Captain Coles. Perhaps you will not be at a loss to discover the cause of it when I read it. It relates to the rolling of the ships, when no wooden frigate would have thought of fighting her guns at the time; and Admiral Yelverton says:—"I do not allude to the 'Wivern,' "for the sea would have washed into the ports of her turret, and swamped every-"thing inside." Now, if the object of Captain Coles, or the object of any other gentleman, be to produce a momentary or temporary impression in favour of an invention or plan, then I contend that there is no reasonable objection to offer to this system of quotation, because it is one with which we are too familiar, which is very common, and which is I presume justifiable on the ground of its being so universal. But if it be the object of Captain Coles to impress the value of his system upon persons who are responsible for the adoption of it, and if it be, as I really think it ought to be, in justice to his own plan, his business seriously, measuredly, and guardedly to represent the merits and the demerits of his system, to seek to get it adopted upon its merits (for that it has many merits I am one of the foremost persons to admit), then I say that that style of writing papers ought to be amended, if he will excuse me for making the remark. I have here a series of notes which I have taken during the reading of Captain Coles's paper, which are almost—I really am sorry to make such an observation—which are almost beneath serious consideration. Of such a character is the remark upon the coal-carrying power of the "Captain" and of the "Bellerophon." The "Captain" carrying a given quantity of coal, and the "Bellerophon," carrying a given quantity, we are told that if you put 490 tons more, as you can, between the decks, the "Captain" can carry so much more,—Captain Coles never mentioning that you can put 490 tons more on the "Bellerophon," which she is perfectly capable, and far better capable, of carrying between her decks than the other ship. I do not consider it necessary at this late hour to occupy the time of the meeting by dwelling upon the points that I have noted down. But I am in a position to say this—I am very desirous, and am pleased to have the opportunity of saying this—that it is a great delusion and a great mistake to suppose that there is any interest, on the part of any person in any degree related to the official management of the Navy of this country, adverse to the adoption of the turret principle. I certainly have no such interest. I went to the Board of Admiralty with the complete design of the "Bellerophon" in my hand. I tendered that to the Board of Admiralty. And when some opposition was offered on the ground of the magnitude of the guns, I entreated that that ship might be built instead of another wooden ship, which had been sanctioned by Parliament to be plated with armour. The Admiralty yielded the point, and my ship was built, but I have never received a single sixpence for the design of the "Bellerophon;" and yet people speak of me as having an interest in opposing the turret system. I say it is too bad, when the sole reward and the sole emoluments have been all on one side, that in a question of this magnitude, official persons who have received nothing, should be put in the disadvantageous position of being represented as interested opponents of the turret principle. Now, I am not; I am an advocate for its adoption. I will go so far as to say that, if Captain Coles will do with me, personally, what he has done with Messrs. Laird—if he will acknowledge the inevitable conditions of the problem, and work with me on those conditions, I will co-operate with him; but if Captain Coles will demand of designers so much more than is possible, and if he will repudiate a design from myself, and then accept nearly the same design two years later from somebody else, then I say there is no rapid progress in store for the

re-construction of the Royal Navy on his plan. Because, while I am an admirer of the Navy, I hope that all the gallantry does not belong to the Navy, but that a civilian may be considered to have some sense of integrity and some consciousness of the respect due to him and to his position. I will only trespass a short time further upon your notice. I will not say one word in defence of a gallant officer, under whom it has been my great privilege and pleasure to serve for several years—Admiral Robinson, the Controller of the Navy. It is not my duty to defend Admiral Robinson, and I will not attempt it. But I will beg the privilege of saying this, that Admiral Robinson is a very able and very zealous officer; that the criticisms which have been passed this evening are *ex parte* and irresponsible. When I say "irresponsible," I mean that they have not that responsibility which they would carry if they were intended to be a direct instigation to official action; they are irresponsible in that degree, and in that respect. Now I will only ask the gallant officers present, who are brother officers of Admiral Robinson, to bear in mind that they have, in him, an officer of great ability and great zeal; and *ex parte* statements with regard to him ought not to be received with derision on the part of any of the company present. I mention that because I observed an occasional smile at extracts from Admiral Robinson's report. I can only say it would be well for the country in the past, and for the country in the future, if all official persons were as capable and as zealous as Admiral Robinson has been. Now, permit me to express a last regret. I had hoped, when I came here this evening—and I may be permitted to say that Captain Coles was so kind as to set aside any little asperities which may have possibly been imagined to have existed in the past, and to favour me with a ticket in addition to that which I received from the Institution—I came here in the strong hope that we were about to hear for the first time a very impartial and a very careful statement of the merits of the turret principle, which are certainly due to its present position. Do not let officers suppose that I myself—and I am but a subordinate officer of the Admiralty, a civilian officer, and there are many gallant officers at the Admiralty above me, influencing me and controlling me—do not imagine that even I am insensible to the enormous value of being able to put a gun through a small port, and of being able to bring it to bear through a large arc on the enemy, or insensible to the many advantages pointed out by Captain Coles. But I am bound to be guided by facts; and I must say it is a most extraordinary thing that Captain Coles thought himself justified in putting a small ship like the "Wyvern" alongside a broadside ship, and telling you deliberately that 7° represented the rolling of the turret ship, and 20° represented the rolling of the broadside ship. The fact is, that the "Wyvern" is one of the very worst rollers in the squadron. The "Achilles" is a land battery, and the "Bellerophon" is a large approximation to a land fortification, as compared with that rolling structure the "Wyvern," which is continually under water. That I may not be supposed to be speaking without my book, I will simply say that that opinion is amply confirmed by the reports of the officers who commanded the squadron. It is the fact that the "Wyvern" was one of the very worst rollers in the whole squadron. I should like to say in your presence, Sir [to the Chairman, Captain Fishbourne], who have made the rolling of ships a scientific study for a long time, that it must be obvious that the rolling of ships does not exclusively depend upon the freeboard. As regards a height of two or three feet, I perfectly admit and know full well that the "Monitor" is the steadiest form of ship that you can possibly have. Inherently she is so. And although the "Achilles" rivals the "Miantonomoh" in steadiness, and is certainly not a turret ship, still I am prepared to admit that the turret-ship has advantages in that respect when the freeboard is so low as in the American monitors. But when you come to four or five feet in a small vessel, like the "Wyvern," you do not get the steady platform; you do not get that imaginary dry platform, so comfortable and so safe under all conditions; but you get a ship with the seas rolling over her and swamping the guns; in fact, a ship so bad, that Admiral Yelverton expressly says he does not condescend to mention her. As at the beginning, so at the end, I decline absolutely the position of being an opponent of the turret system. If my observations are taken in the spirit in which they are offered, I think I shall be taken by impartial persons to be as good a friend of the turret system as other persons. It is a piece of ancient philosophy that the friends who point

out our faults are, after all, our best friends. I have always been and always shall be most anxious to co-operate with Captain Coles; and I think I am not an insubordinate officer of the Admiralty. I shall be only too proud to act under authority in endeavouring to bring this question to a proper bearing. I will only further say that Captain Coles very early in his paper used a remark which I object to. He spoke about the persons in office who resist the speedy adoption of his principles as the "anti-turret party." Now do pray remember that the late Admiralty did not invent broadside ships. Broadside ships have existed for ages. Captain Coles is the innovator, and it is the duty of the innovator to show that the old system is bad. He comes forward with a new invention, and because those in office have not so much confidence in it as he has himself, he calls them a "party." This, I think, is absurd. It is the too ardent advocates of turrets who form a "party," and they, not we, are partizans.

The discussion was then adjourned till the following evening at eight o'clock.

Adjourned Discussion.

Thursday Evening, May 2, 1867.

Captain FISHBOURNE, R.N., in the Chair.

The Chairman: I have no doubt you will think it desirable to confine the discussion as much as possible to the points raised in the paper, and I therefore propose that Captain Coles should read us the conclusions that he has come to.

Captain Coles read the following conclusions:—

"In conclusion, it is obvious, I believe, that by lowering the freeboard to the minimum, the following advantages are obtained, viz.:—

"1st. A steadier gun platform, and incidentally less risk of being struck below plating whilst rolling in a seaway, as well as the power of fighting these heavy guns in a seaway.

"2nd. Diminution of area to be plated makes smaller vessels and thicker plates practically available.

"3rd. Diminution of target and increased thickness of plates, both incident to lowering the free board, seem the only effectual means of resisting the advances of modern guns and projectiles.

"4th. Less expense in the first outlay to produce these costly ships, since less tonnage is required, and fewer men, making it practicable to man more ships in time of war.

"The disadvantages often alleged to be incidental to a low free board, viz., discomfort to the ship's company, is obviated in vessels of every class by means of a hurricane deck, such as I have described in figs. 6, 7, 8, and 9. I would also observe that the recent improvements in guns and projectiles have increased the risk, previously very great to vessels with high free board and central casemated batteries, from the entering of the shell, either through their large ports, or through their weak sides, and this is a risk which there is no means of obviating in broadside ships.

"Disregarding for the moment all other considerations than the comfort of the ship's company, it still seems questionable whether any increased comfort in time of peace from a high free board, is not more than counter-balanced by their greatly increased weakness from the cause I have mentioned, in time of war."

Captain Scott, R.N.: Mr. Chairman and Gentlemen, the lecture we have had is so important, that I think it necessary to follow the principal points *seriatim*, being as brief as possible on each; and, with that view, I will first remark that we all of course speak of what we are full of: "Out of the fulness of the heart the mouth speaketh." So Captain Coles speaks of his proposed turret-ships, and exhibits, as you see, eight

or nine specimens. There is the "Captain," now building. But we must remember that the rapidity of improvement is very great indeed, and therefore the comparison between ships building with those not only built, but also in commission, is manifestly unfair. For a fair comparison we must compare each idea of the turret ship at a particular time with the broadside ship of the same time, or else we do not get the true comparison. The broadside ships are being developed day by day quite as much as the turret-ships are being developed. I think I shall be able to show that the whole principle of the broadside ships has been considerably improved. We must not be tied down to that comparison which, if Captain Coles will allow me to say so, he has so constantly made with broadside ships, and now makes of the "Achilles," a vessel built years since, and armed with 68-pounders, against turret ships armed with the heavy guns that are now carried. When these broadside vessels were designed, there was no such gun, therefore they could not be designed for what did not exist. In order to have a fair judgment on the subject, it is necessary to bear all these points clearly in mind. Now, of the Channel squadron the reports are seemingly unfavourable. You heard them read last night; the most unfavourable parts of them were read, but why were they unfavourable? because the guns were mounted on the obsolete plans of 1864 and 1865. We had gone into a new system of artillery, but we had stuck to our old carriages, tinkered up, it being probably thought they would be cheap, which they were, and very bad at the same time. Now, to show that this view is fully borne out, I have to revert to the opinions of the different Officers, and without saying that they are *verbatim*, I, as one of those who commanded a vessel during this time, and knowing well what passed in the vessels, hearing the opinion of each Captain, can give a tolerably clear idea—at any rate, I ought to be able to give you a clear idea—of their opinions. Now I find that the Captain of the "Hector" reports that the compressors were not to be depended upon, and that the train whips carried away, the compressor should hold the gun on recoil, and the train whip should run the gun in; so that the two principal things for working the guns were not to be depended on. The Captain of the "Achilles" also says the compressors were unreliable. The Captain of the "Lord Clyde" says that the running in and out gear is bad; there was no control over the guns. The Captain of the "Pallas" wishes pauls fitted to prevent the guns getting adrift. And as to the "Research," I have no hesitation in stating that her guns did get adrift, and I showed the reason. Can it be surprising that with the fittings I have just mentioned, those old fittings, and with such a tremendous swell as there was running at the time of the special trial, that the guns could not be fought satisfactorily? When has it ever been attempted to fire guns under similar circumstances? It must be remembered that the Admiral expressly states in his report that none of our wooden frigates would have thought of opening their ports in such weather; and here were those vessels laid purposely broadside to the swell, and attempts made to fire the guns with the old fittings, and therefore the result was not satisfactory. The explanation is as simple as possible. But to compare this weather, when the men could scarcely stand, with the weather in which the "Royal Sovereign" guns were tested, is absurd. She was merely tested in the Channel; and here were those broadside vessels rolling about in the very worst swell that could be found in the Atlantic. Now as to the "Bellerophon's" firing only two rounds, which have been very much dwelt upon, the "Bellerophon" went to sea before her gun carriages were ready. She had two guns on board; one of them was mounted on Armstrong's competitive carriage, which had competed with mine, and fired some sixty rounds; and the other was mounted on a wooden carriage, so weak that, after one or two rounds before the ship went out, they decided that it was unsafe to fire it any more; so that gun could not be fired. In the other case of the gun, its carriage had been taken out and restored, and then no person could adjust Armstrong's compressor. At the first round fired, the gun came in flying. The compressor was screwed up again, and the same thing happened. Nobody could adjust it, or perhaps from the effects of the competition its holding powers were gone. Whatever was the reason, the second time of its acting in that violent way, there being no power to control it, the Captain wisely determined not to fire again, but he says expressly he could have very easily fought his guns even at that time. I am sorry the Captain's

reports are not printed, because he so decidedly says this. Now when, as I have shown, the Admiral speaks of guns badly mounted, it was what *was*, not what *is* at the present time. What *was* is simply this, that the ports were obliged to be opened to load the guns; what *is*, that we can lower our ports down in a sea-way, and load through the scuttles, and, with the training gear that is to be applied, this will be effected very easily, and these guns will be fired with great rapidity, far quicker than any firing in the turret, as I shall presently show. So that you see what Captain Coles so much insists upon, as to the powder being kept dry, is actually being carried out. The port is closed, there is simply a scuttle. Then, with the new fittings, the guns are run out rapidly. There will be no difficulty in training the guns, and elevating as they go out, and thus the guns can be kept bearing upon the object. The captain of the gun has plenty of space, and is enabled to see, and he fires when the gun is upon the object. Now, with reference to the size of ports: in the "Minotaur" the port was filled up, so that it was only 2 feet 9 inches deep, and 2 feet wide, and the gun then trained 30 degrees each way. There was no difficulty at all found in pointing, and the practice was exceedingly satisfactory. With the "Bellerophon" the lower part of the port was closed up, and narrowed to 2 feet 1 inch, and the gun trained 3½ degrees each way. This carriage is on board at the present time. Some Officers probably have seen it; at any rate they will be enabled to see it, if they wish. There is another reason why, as I said before, the ports can be closed up, as all that you want is sufficient height of gun to fire over the lower port cill you can use an elevating and depressing carriage. I shall presently show the advantage that it would give the broadside-ship, and then the gun goes closer out in the broadside than in the turret. There you see a diagram of the turret. I am not able to bring it in front, but you will at once see that in the turret the gun would be further out. Therefore for the same sized port, you would get less elevation and depression in the turret than you do with the broadside; and the turret's port will be found a very little smaller than the port was in the "Minotaur" when it was closed up in the manner I speak of. As to the gun's recoil, which Captain Coles thought to be limited to coming in six inches, I may inform him.

Captain COLES: I did not say coming in six inches. I said six inches inside the port.

Captain SCOTT: In the "Minotaur" the gun was allowed to come in 3 feet 6 inches. It came in 3 feet 6 inches clear of the side. That was found a great deal more than was necessary, so the gun on that carriage is now not allowed to come in more than 18 inches, clear of the port; and that gives a mean of about a foot, and there is not the slightest difficulty in loading. Now, as to seeing all round in the turret when that figure gets up and looks round, and sees a ship, it cannot be supposed, for one instant, that you are to depend on him, that is, on the captain of the gun for picking out his ship and firing at it. Why, in a general action, you would have one captain of a gun firing at a friendly vessel, and another captain firing at the enemy. It must be under the direction of the Officer of the quarters, who must be told in general terms where the vessels are, and to look out for those vessels. In fact, if a seaman exercises his individual ideas on the subject, you will have the greatest possible confusion. Therefore I think that remark as to the advantage of the captain of the turret gun, getting up and looking round, is really an imaginary advantage. I believe that the "Captain's" port, or the gun in the "Captain" is 11½ feet out of the water. Am I right?

Captain COLES: Yes.

Captain SCOTT: Very well, the gun in the "Monarch" is to be 17 feet out of the water—that vessel which is so much objected to. Now, in Admiral Yelverton's report, at page 7, he states, "The turret-system of arming a ship "would have a great triumph on this occasion, for there is no doubt that a "sea-going turret-ship, say 12 or 14 feet out of the water, would have fought "her guns without the slightest difficulty, and have fired easily six shot to every one "from our broadside-ships. I do not here allude to the 'Wyvern,' for the sea would "have washed into the ports of her turrets and swamped everything inside." The Admiral here expressly points out that it is a vessel with high freeboard—a vessel whose gun would be 17 feet out of the water, which is precisely what the "Monarch's" is, that would have had an advantage over his squadron.

The CHAIRMAN: I do not think it is so stated there. It says "the gun."

Captain SCOTT: It does not say "the gun." It says, "a sea-going turret-ship, say 12 or 14 feet out of the water."

The CHAIRMAN: Read the whole of it.

Captain SCOTT: "There is no doubt that a sea-going turret-ship, say 12 or "14 feet out of the water, would have fought her guns without the slightest "difficulty, and have fired easily six shot to every one from our broadside-"ships. I do not here allude to the 'Wyvern,' for the sea would have washed into "the ports of her turrets and swamped everything inside." But the sea in the same manner will roll over the "Captain's" deck with a low freeboard, and, to use the words of the Admiral, "swamp everything inside her turrets." The very incline of her deck will tend—will materially assist this action. Look at a breakwater, and see how the sea rolls over it; but on dropping the port, as you can in broadside-ships, and loading through the scuttle, the whole weight of the sea may come flying against the port, but it cannot sweep over the deck and swamp everything inside. I turn again to the Admiral's report—to pages 2 and 5, to see the value of the vessel with the low freeboard. "On both these occasions I was able to "judge of the performance of the squadron, blowing hard with a heavy sea, and "have no hesitation in saying, that under all the circumstances of bad weather in "the Atlantic, I see no reason to apprehend that the ships of this squadron would "make worse weather of it than any of our line-of-battle ships. I must, however, "make two exceptions to this, namely, the 'Hector' and 'Wivern,' neither of "which are, in my opinion, in their present condition safe in bad weather; the "'Hector,' from the difficulty (if not impossibility) of getting rid of the water she "would be certain to ship, if caught in a cross sea caused by a sudden shift of wind; "and the 'Wivern,' from being so low in the water, that with the everyday Atlantic "swell only, she is compelled to be battened down, if not head on to it, and even "then the sea breaks over her deck in a way that renders it a service of danger for "the men to pass along it. On reaching the cruizing-ground she was soon short of "coal, and I was obliged to send her to Bantry to fill up; but the experience I had "of her performance up to that time convinced me of her unfitness to keep the sea, "and I ordered her to remain at Bantry until the end of the cruise, when she joined "me having to put back on one occasion in the face of a strong south-easter. I was "subsequently informed by Captain Burgoyne, that on the occasion of steaming down "Channel, this vessel had two of her fires partly extinguished through shipping a "heavy sea, which circumstance has already been reported to their Lordships. The "'Wyvern' does little under sail, and is totally unfit for the duties of a sea-going "vessel, but she is well adapted for coast defence." Now, I was one of those present who saw the "Wyvern's" pitching and rolling, and certainly she did it to a very considerable extent. She had netting triced up on each side, and on one occasion a heavy sea rolled on board of her, and when it left, the men were caught in one of the nettings, like fish, safely bagged and brought back. Again the helmsmen could not pass along the deck without a wetting in ordinary weather. As to the "Wyvern," the Admiral further says, "This vessel could never have been intended as a cruizing or sea-"going ship, for, although she is buoyant and rises to the sea, yet from her being so "very low in the water, it rushes up her sides over all, and when broadside to the sea, "it is impossible to move about on her decks without the risk of being washed over-"board. At sea she is almost always battened down, to the exclusion of air in the "engine-room and stoke-hole. Under sail she does very little, and her stowage of "coal is limited." I will make one remark with respect to her stowage of coal—when Captain Burgoyne filled up, being ordered to rejoin the squadron the last time, he did not consider it safe to take in the whole quantity of coal, and therefore took considerably short of the quantity. The report continues: "If the 'Wyvern' had to cross the "Atlantic, I would suggest that she be fitted with a fore and aft bridge, like the "'Miantonomoh,' and, like that vessel, be escorted by a powerful steamer." Now, if the "Wyvern" was not built to cross the Atlantic, and operate along a stormy coast, for what on earth was she built? Next with regard to sail power, so necessary in cruizing. As you see Captain Coles' imaginary vessels, because I must call them so, are to have little or none. I suppose I make no mistake, however, in saying that

reports are not printed, because he so decidedly says this. Now when, as I have shown, the Admiral speaks of guns badly mounted, it was what *was*, not what *is* at the present time. What *was* is simply this, that the ports were obliged to be opened to load the guns; what *is*, that we can lower our ports down in a sea-way, and load through the scuttles, and, with the training gear that is to be applied, this will be effected very easily, and these guns will be fired with great rapidity, far quicker than any firing in the turret, as I shall presently show. So that you see what Captain Coles so much insists upon, as to the powder being kept dry, is actually being carried out. The port is closed, there is simply a scuttle. Then, with the new fittings, the guns are run out rapidly. There will be no difficulty in training the guns, and elevating as they go out, and thus the guns can be kept bearing upon the object. The captain of the gun has plenty of space, and is enabled to see, and he fires when the gun is upon the object. Now, with reference to the size of ports: in the "Minotaur" the port was filled up, so that it was only 2 feet 9 inches deep, and 2 feet wide, and the gun then trained 30 degrees each way. There was no difficulty at all found in pointing, and the practice was exceedingly satisfactory. With the "Bellerophon" the lower part of the port was closed up, and narrowed to 2 feet 1 inch, and the gun trained 3½ degrees each way. This carriage is on board at the present time. Some Officers probably have seen it; at any rate they will be enabled to see it, if they wish. There is another reason why, as I said before, the ports can be closed up, as all that you want is sufficient height of gun to fire over the lower port sill you can use an elevating and depressing carriage. I shall presently show the advantage that it would give the broadside-ship, and then the gun goes closer out in the broadside than in the turret. There you see a diagram of the turret. I am not able to bring it in front, but you will at once see that in the turret the gun would be further out. Therefore for the same sized port, you would get less elevation and depression in the turret than you do with the broadside; and the turret's port will be found a very little smaller than the port was in the "Minotaur" when it was closed up in the manner I speak of. As to the gun's recoil, which Captain Coles thought to be limited to coming in six inches, I may inform him.

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Captain SCOTT: It does not say "the gun." It says, "a sea-going turret-ship, say 12 or 14 feet out of the water."

The CHAIRMAN: Read the whole of it.

Captain SCOTT: "There is no doubt that a sea-going turret-ship, say 12 or "14 feet out of the water, would have fought her guns without the slightest "difficulty, and have fired easily six shot to every one from our broadside-"ships. I do not here allude to the 'Wyvern,' for the sea would have washed into "the ports of her turrets and swamped everything inside." But the sea in the same manner will roll over the "Captain's" deck with a low freeboard, and, to use the words of the Admiral, "swamp everything inside her turrets." The very incline of her deck will tend—will materially assist this action. Look at a breakwater, and see how the sea rolls over it; but on dropping the port, as you can in broadside-ships, and loading through the scuttle, the whole weight of the sea may come flying against the port, but it cannot sweep over the deck and swamp everything inside. I turn again to the Admiral's report—to pages 2 and 5, to see the value of the vessel with the low freeboard. "On both these occasions I was able to "judge of the performance of the squadron, blowing hard with a heavy sea, and "have no hesitation in saying, that under all the circumstances of bad weather in "the Atlantic, I see no reason to apprehend that the ships of this squadron would "make worse weather of it than any of our line-of-battle ships. I must, however, "make two exceptions to this, namely, the 'Hector' and 'Wivern,' neither of "which are, in my opinion, in their present condition safe in bad weather; the "'Hector,' from the difficulty (if not impossibility) of getting rid of the water she "would be certain to ship, if caught in a cross sea caused by a sudden shift of wind; "and the 'Wivern,' from being so low in the water, that with the everyday Atlantic "swell only, she is compelled to be battened down, if not head on to it, and even "then the sea breaks over her deck in a way that renders it a service of danger for "the men to pass along it. On reaching the cruizing-ground she was soon short of "coal, and I was obliged to send her to Bantry to fill up; but the experience I had "of her performance up to that time convinced me of her unfitness to keep the sea, "and I ordered her to remain at Bantry until the end of the cruise, when she joined "me having to put back on one occasion in the face of a strong south-easter. I was "subsequently informed by Captain Burgoyne, that on the occasion of steaming down "Channel, this vessel had two of her fires partly extinguished through shipping a "heavy sea, which circumstance has already been reported to their Lordships. The "'Wyvern' does little under sail, and is totally unfit for the duties of a sea-going "vessel, but she is well adapted for coast defence." Now, I was one of those present who saw the "Wyvern's" pitching and rolling, and certainly she did it to a very considerable extent. She had netting triced up on each side, and on one occasion a heavy sea rolled on board of her, and when it left, the men were caught in one of the nettings, like fish, safely bagged and brought back. Again the helmsmen could not pass along the deck without a wetting in ordinary weather. As to the "Wyvern," the Admiral further says, "This vessel could never have been intended as a cruizing or sea-"going ship, for, although she is buoyant and rises to the sea, yet from her being so "very low in the water, it rushes up her sides over all, and when broadside to the sea, "it is impossible to move about on her decks without the risk of being washed over-"board. At sea she is almost always battened down, to the exclusion of air in the "engine-room and stoke-hole. Under sail she does very little, and her stowage of "coal is limited." I will make one remark with respect to her stowage of coal—when Captain Burgoyne filled up, being ordered to rejoin the squadron the last time, he did not consider it safe to take in the whole quantity of coal, and therefore took considerably short of the quantity. The report continues: "If the 'Wyvern' had to cross the "Atlantic, I would suggest that she be fitted with a fore and aft bridge, like the "'Miantonomoh,' and, like that vessel, be escorted by a powerful steamer." Now, if the "Wyvern" was not built to cross the Atlantic, and operate along a stormy coast, for what on earth was she built? Next with regard to sail power, so necessary in cruizing. As you see Captain Coles' imaginary vessels, because I must call them so, are to have little or none. I suppose I make no mistake, however, in saying that

those are sails (pointing to diagrams). They cannot be the sails of a boat hoisted in the centre of the ship. I see they are the ship's sails, but on the hurricane-deck shown, would there be room to work a vessel's sails properly? I ask any one to look at the amount of room on that hurricane-deck to work a vessel under sail.

Captain COLES: 24 feet broad.

Captain SCOTT: As respects the value of sail power, I may mention that the "Research" was ordered to rejoin the squadron. Of course the "Research" had very small steam-power, and so the squadron steamed away and left me behind. I could not help myself. But being ordered to rejoin, and steaming out of Cork, just as I got abreast of Daunt's rock the vessel broke down. In the evening, the Admiral had said to me, the weather was so bad, and there was such a nasty sea on, he thought I had better not go, but if, in the morning, I was still anxious to leave, I might go, so I went. There was a very nasty sea, a tumbling sea, close to Daunt's Rock. We were making a close shave of it, for we could not afford to burn much coal. I thought it possible that the "Research's" passage would be timed, and immediately made sail. We wore at once sharp round close to the rock and stood over across to the other side and worked out under sail against the breeze and against the tide. There we were beating to windward some hours, until the Engineers repaired the valve, which had broken, and then we went on again, steaming and sailing. Now there is a case, in which, if the vessel had not had sailing power, I do not know what she could have done. We could not have anchored off Daunt's Rock. We must have gone ashore there. Next as to the accommodation of the turrets, I will turn to page 169, in the House of Commons Return on Turret-ships, and read to you what is said, because there is nothing like what is official as to matters of fact: "The space occupied by the turrets and the absence of "gun decks, renders it difficult, if not impossible, to provide properly for the "accommodation of officers and ship's company; while the necessary clearness of "the upper deck prevents her from carrying the requisite proportion of boats, "spare spars, and other gear, which must ever form a necessary part of the "equipment of a man-of-war."

Captain COLES: What report is this?

Captain SCOTT: That is what Admiral Key gives as a summary, and places in the hands of Government as an official document summing up all those points.

Sir FREDERICK NICHOLSON: It is the Report of the Earl of Lauderdale's Committee.

Captain SCOTT: Yes, the Earl of Lauderdale's Committee, I have read from the paper, because I wish to go point by point through it. The turrets are deficient in offensive power, because they are too low to fire down upon torpedoes which will be largely employed, I doubt not, in future warfare. You see the deck of the turret ship is also in the way. The amount of depression the turret guns are calculated to give is only 5 degrees, and from this small amount of depression, and being so low in the water, they lose the valuable point of being able to fire *down* not only through a torpedo, but through any other vessel alongside of them. The decks of vessels, up to the present time, are not armoured, therefore, I think, the height of the gun is a very great advantage in enabling you to fire down on a vessel that may be alongside. Secondly, the turrets fire very slowly, because space is limited. If you look at that diagram, you will see at once what a small amount of space there is for loading. These (pointing) are two 600-pounders, I believe the turret is the size of that which is to be in the "Captain;" and the general arrangements are the same.

Captain COLES: What is the diameter of that turret—the interior diameter?

A MEMBER: It is probably 25 feet.

Captain SCOTT: It is in proportion to the size of the gun. I will tell you what it is taken from. I succeeded some time ago in getting a sketch of the turret devised by you at the end of 1865 for two 600-pounders, it was sent up to the Admiralty. This is the exact copy of it.

Captain COLES: That is not the "Captain's."

Captain SCOTT: It is very similar to it?

Captain COLES: No.

Captain SCOTT: If you say it is a foot larger or smaller, I will take it at that.

Captain COLES: It makes a difference in the diagram.

Captain SCOTT: But for all practical purposes, as to space, it is the same?

Captain COLES: That will make all the practical difference in the illustration.

Captain SCOTT: I shall be happy to allow you the benefit of a foot or two either way, if you will point out where it is wrong; but, as you can see, the space is exceedingly limited, owing to the roundness of the turret. This platform is very nearly 4 feet high. The man has to get on it in order to load, so that passing up the shot and powder, especially when the ship is rolling, with the sea coming in, would be a service of no slight difficulty. The man cannot stand upon the deck, as in the broadside, and he has not room to load; therefore, you will find invariably, the firing of the turret gun exceedingly slow. Actual turret warfare confirms this; and the firing of the "Royal Sovereign" has shown exactly the same result. Now, as to Captain Coles' Report on the quickness of firing, in the Trusty's Turret, there is a very simple solution to that. The gun was only a 40-pounder, and in the turret, was mounted on an inclined plane, so that when fired it ran out again, and as it was a breech-loader, it could be loaded at once; whereas the gun mounted on the broadside had to be run out by the crew. That made the difference, and in that lies the difference in the times of firing. Whether Captain Powell made the mistake I cannot tell, but that is the real reason of the difference in the quickness of firing in the Trusty. We will turn to page 168. Here are all the experiments with the "Royal Sovereign's" firing. It is only necessary to give them generally.

Captain COLES: Will you state the year it took place?

Captain SCOTT: The 3rd of October, 1865, is the date of this report.

Captain COLES: This is 1867.

Captain SCOTT: I will give you also the firing of broadside guns in 1865, and then put the two side by side, year by year. With the one-gun turret, (we wont go to the two,) there was an interval of one minute and twenty-three seconds between the firing the rounds, and this was the quickest number of rounds that were fired. What Admiral Key says is this:—"In the 'Royal Sovereign' a gun's crew of 30 "men who had been carefully trained in a turret for nearly a year, and who had "fired about 100 rounds with shot, beside much practise without firing, completed "ten rounds as follows, the quickest ten consecutive rounds being selected, *vide* "Report B." And these are the quickest ten consecutive rounds that were fired. They occupied 13 minutes and 51 seconds. The gun carriage that was put on the "Minotaur" was completed in 1865; but the experiments did not take place until January, 1866, as there were no competitors ready. Sir William Armstrong was to have come forward as a competitor, but did not. One of the Arsenal carriages did however turn up. That gun carriage had only four men at it, who had been at the "Research's" iron gun-carriage before, the others were taken from volunteers. The whole crew of the ship volunteered to go. The gun's crew was 14 men, not 30, as in the turret. The firs time they fell in, the gun was fired ten rounds in eight minutes and fifty-four seconds.

Sir FREDERICK NICHOLSON: At a target?

Captain SCOTT: No; under just the same circumstances as the others. We are taking the quickest ten rounds. The crew pointed every time and turned the gun.

Captain COLES: In this case, with those two guns a small target was fired at 1,000 yards distance, and good practice made. That is very different to firing at nothing. That is child's play. Any one can fire a gun off.

Captain SCOTT: But as to the very quickest interval between the rounds—there has been no shorter interval on board the "Royal Sovereign" than one minute in all the firing there. In the "Minotaur" following up this first quick firing, the later rounds were only with half-minute intervals. Ten rounds were fired in four minutes and forty-eight seconds. Another ten rounds in five minutes and one second. Now you will see what it really comes to, as to quickness of firing. In the "Bellerophon" the other day with elongated shot which are exceedingly difficult to load, not the round shot, which were tried in the turret, but with elongated shot weighing 260 lb., instead of the 150 lb., round ball, five rounds were fired in three minutes and forty-one seconds. With respect to the rolling, I need not touch upon that, because the "Wyvern" rolled quite as much or more than the "Research," and

in the recorded rolling you will find that the "Wyvern" rolled as much as any vessel in the squadron. As to the favour shown; I have understood that £13,000 was spent on the "Scorpion." The outlay on the "Research," has been £11,000, including putting a deck on her, and making her in fact a very different vessel, and a very comfortable one. This is altogether from first to last, on her fittings and on her alterations, and everything that was done. She has been very considerably more than three years constantly employed backwards and forwards. The "Royal Sovereign" has been continually in hand, and I believe she has been in hand for the last six months.

But let us now examine the relative power of the Broadside and Turret vessel, and suppose the case of two enemies engaging the "Bellerophon," and two engaging the "Captain"—in one case we have a broadside in the "Bellerophon," of 1,500 lbs., and in the case of the "Captain," of about 1,200 lbs against each enemy. If you take the quickness of firing to be inversely as the size of the guns, that of the 600-pounders would be very slow, and I should say the weight of metal discharged against two enemies by the "Bellerophon" from her being able to discharge on both sides together would be treble, certainly more than double, that of the "Captain." The "Monarch" I saw a few days ago, and I am happy to state I did not see that she was being turned into a box. As the semi-turret has been spoken of, I may state that the guns are put out here, the after gun fires right a-beam and right aft, and the forward gun right a-beam, and also right forward, so that these two guns can fire right a-beam, and command a-head and a-stern. These two guns are a very great height out of the water. They are over 20 feet. I do not think that that is a semi-turret: it is a fixed thing. Of course we give Captain Coles all credit for the adoption of the turn-table which is a very great advantage, the distinctive feature being a turn-table which carries the gun upon it, enclosed in an armour casing. I may here say a word or two about one's own particular vanity, but first I wish to show that the turret has been well considered and well developed, I think Captain Coles has had great advantage in that respect. He has been working at it continuously, and his suggestions as to mounting the guns, and on almost all points, have been carried out, which has not been the case with the broadside vessels.

Captain COLES: May I ask how you know that?

Captain SCOTT: As far as I see, and as far as what you have done, I believe it is pretty nearly the fact. For fast cruisers I have been inclined to give up armour altogether, and to get great height of free-board out of the water, trusting to the power of the guns to keep down in a great measure the attack of any rival vessel. I consider that we could not go far wrong in building fast unarmoured vessels; and therefore as one development of the broadside, I have taken a small turn-table, and having 12-ton guns upon each side, have used it so as to gain the power of firing a-head or a-stern; (all those three guns will fire within 13 degrees of the line of the keel forward or aft). My idea is to fire with great rapidity, which you can do on the broadside, and within 13 degrees of the line of the keel. You may discharge your three guns, you may shear your vessel only through 26 degrees, and then you may discharge your other guns; and you get a great height out of the water. This sea here is shown exceedingly small, (pointing) but the Atlantic wave is about 12 feet in height, and would continually interpose between the turret gun and the broadside vessel.

Captain COLES: The turret gun is 12 feet in height, the same height as the broadside. My principle is the same height in ships of the same class.

Captain SCOTT: I am alluding to the "Captain." The gun is low: it certainly is not high. If the gun is high it does not represent the "Captain." That seems to be a high freeboard and a high gun, and it does not carry out the principle of the low freeboard.

Captain COLES: Oh yes, it does.

Captain SCOTT: Certainly it does not illustrate the "Captain." I have made a few remarks on this subject. It is one that needs very great consideration, and I believe that these discussions have a very good effect, for we are shown our weak points, which we cannot see before. We are all too fond of our own plans; and in laying them before you of course we get them fully discussed; and in fact, the wheat

is sifted from the chaff, which I hope will be the case at the present time, and that all of us, working together as we are doing, may assist—because that must be the ultimate object of us all—in placing our country in such a position that she shall remain the unrivalled mistress of the seas.

Vice-Admiral R. S. ROBINSON, Controller of the Navy: Mr. Chairman: It is with extreme diffidence that I venture to address the audience that I now see before me, for several reasons. I know that the subject on which I am about to speak is one with which most people here are not only thoroughly acquainted but on which they would deliver their opinions in far better language, and in a far clearer style than I can possibly attempt to do. In the next place I have not had the advantage of hearing the commencement of this lecture, or hearing what the gallant officer Captain Coles has, I have no doubt, so well and so ably put before the meeting, and I am therefore rather in the dark as to the points on which I wish to direct my observations. But this to me is perfectly clear: we are discussing a question of the very greatest moment, a question on which all personalities should entirely disappear. However amusing it may be, and however advantageous for the moment it may be, in discussing such questions as these, to make use of a personal argument, or to give a home-thrust to an opponent, the cause of truth—that cause which we know is at the bottom of every man's desire in this assembly—the cause of truth suffers in the end from the temporary triumph anybody may obtain by a good hit and a smart thrust. Now I wish as much as I possibly can, in discussing the question which I wish to discuss, to avoid personalities. If in advocating the views I have to advocate, I am unfortunately led to mention anybody's name, I trust that I shall mention it in such a way as to give no cause of offence to that person, and should I by any accident make use of an expression in the fearless and free discussion which I court for my own opinions, and which I think that others will be equally willing to accord to me the liberty of using—I say, if by any accident, any word or phrase of mine shall hurt any such person's feelings, I apologise beforehand, and request him to attribute it only to my unskilful use of the weapons I wish to use, and not to any desire to be disagreeable to him. I should also apologise, before going much further into this subject, for one point which you will very soon find out. My occupations and my avocations day by day are so laborious, that I stand before you not a strong man, not a person capable of making much exertion, and in general, at this time of the day, so completely overwhelmed by the labours that I have to undergo, as to be little fit to address an audience. Now, Sir, the subject which we have to discuss, which I wish to do with as much philosophy and knowledge as I am able to bring upon it, is "the turret system *versus* the broadside system," and I wish to discuss that subject rationally and logically. To do so, we must have a clear understanding of what is meant by a turret-ship, and what is meant by a broadside-ship. Now I stand before you—and perhaps some of you who have found out that I am the Controller of the Navy may be surprised when I say that I stand before you the oldest, the most consistent, and the most persistent advocate of the turret system—yes, of the turret system, for that which it is capable of doing; not of a system which is incapable of performing the work we want it to perform, but the advocate of that system which can perform it, and which can perform it better than any other. Quite in the early days when Captain Coles commenced his most meritorious labours—labours for which I give him all possible credit,—I met my friend Captain Coles—if at this day I may call him my friend—I met with my friend Captain Coles in a state of extreme difficulty, having got his system, the excellence of which was evident to me, before a certain department of State which I will not name, and having got himself into extreme trouble and difficulty with that department. He was kind enough to take me into his model shop, and to show me the inventions, which with so much skill and talent he had prepared for that department, and he also showed me some correspondence, which proved that they were very great difficulties in his way. I am happy to say I was the means of removing those difficulties. I am also happy to say some time after that, I became Controller of the Navy, and was able to forward the views then entertained by Captain Coles, of the turret system. I only state this much to show why I say that I was one of the oldest advocates of the turret system. I may say, without speaking too much of myself, that I assisted Captain Coles extremely

to get the first turret that ever was tried, brought not only to the notice of the Admiralty, but tried in a ship under fire. I assisted Captain Coles moreover to get the first turret-ship that ever was designed or laid down, namely the "Prince Albert." Now I do not want to say more upon my persistency or consistency in advocating the turret system, for what it is fit, and not for what it is not fit. I have persistently and consistently, and do at this moment contend that the turret system, as applied for purposes of either coast defence, inland navigation, or siege artillery, to attack an enemy's port or roadstead in inland waters and in fine weather, is the system of all others in which you can combine the greatest amount of offence and defence. I have never deviated from that opinion, publicly or privately. I advocated it eight years ago. I advocate it now; but because I advocate for a particular purpose a particular weapon, I am not, I think, bound, either logically or philosophically, to say that this weapon, which I believe and know to be the best weapon for that particular purpose, is an equally efficient weapon for all other purposes. I know well, for instance, what you can do with an axe. I know, I have seen work well done by barbarians, if I may so call the Chinese—with an axe, but no one would tell me an axe is able to do all that a saw is able to do. And so while I say, and say with a certain knowledge and clear conviction of the fact, that a turret ship for coast defence and for the purposes I have named, is the very best weapon you can use, I use my judgment, and I have within myself as clear a conviction, founded upon argument, reflection, and logic, that this may not be the best vessel for sea-going and cruising purposes; and to explain more fully what reason I have for this assertion, I would like this Meeting to consider for a moment with me what is the very best form you can give a turret-ship for the purpose of hostilities in inland waters, whether for offence or defence. In inland waters you are restrained by none of the difficulties which the ocean puts into contact with you. You have simply to know how much weight you intend to carry upon the vessel, and to proportion your carrying power to the weight that you intend to put. The lower, therefore, any such vessel can be constructed, the better; the less the draught of water such vessel can be constructed with, the better; all that you require in such a case is a vessel so strong in every part that no shot shall be able to penetrate it, except under circumstances which we must give up, because we cannot absolutely overcome the power of artillery; but under ordinary circumstances you can construct, for the purposes of coast defence, or, as I have said, for siege artillery, without the smallest difficulty in the world, a vessel low in the water, coated with armour-plating, and carrying the heaviest possible guns, and this you may do comparatively in small dimensions. Now when the idea dawned across the gallant officer, it was a great idea; the idea dawned across him to put a gun upon a turn-table, and to surround that turn-table with armour-plating; he came positively upon a very great invention—a very great and successful idea came across his brain. He has laboured in various directions with assiduity ever since, but the first thought, and the first realization of that thought, must have been to him a very considerable and great satisfaction. It is that thought, that idea, embodied in a low level armour-plated vessel like what is now known as the "Monitor" vessel, which is the most perfect conception to my mind of what you ought to have for attack and defence of ports and arsenals, and if the gallant officer had stopped there, I should have said he had done quite enough for his fame—quite enough for the benefit of his country and for the benefit of the world. He has, however, (and he is perfectly right—he views the thing in a different light to what I do—his reflections upon the subject have brought him to a different conclusion from the one I have come to)—he has conceived that there was no more difficulty in adapting this system of turret-ships—that is to say, carrying a revolving gun on a turn-table, surrounded by an armour-plated shield—there is no more difficulty in carrying that in a vessel to contend with the waves of the Atlantic or the stormy ocean, it would have to cross, in conjunction with very great speed, than in making the "Monitor," or the coast defence vessel to which I have just referred. Now it would not be difficult to show that that cannot be; it would not be difficult to show that however excellent the system which requires lowness, for instance, of freeboard, (it is a vital point in a "Monitor" that you should not

expose any of her;) it is not difficult, I think, to show that although that requisition may not be incompatible with a perfect coast-defence vessel, or with a perfect piece of siege artillery, yet that the requirements of a sea-going ship, are entirely different, for the moment you get into waves and into sea-way, the lowness of freeboard signifies at once, that your gun cannot be high out of the water; if your gun is not high out of the water, there come between you and your object various waves more or less high, and your artillery is paralysed. For instance, if your gun is only five feet out of the water—take that as an illustration—these figures will illustrate it better than anything else—say that your gun is only five feet out of the water, and the enemy is 500 or 600 yards from you, how many waves, twelve or thirteen feet high, will there be between you and your enemy? However little the rolling of the ship may be—(we will give the gallant officer the advantage of supposing that his low freeboard will exceedingly mitigate the roll of the ship, which I do not deny for a moment, provided it be really low)—yet he can only fire at his enemy when he is at the top of the wave, and he cannot fire at that enemy's water-line when waves thirteen feet high are between him and the enemy; therefore one great advantage of his artillery is lost to him when he takes a low freeboard as the condition of a sea-going ship. And let me put the alternative. He says, Well, I will not take a low freeboard for my sea-going ship; I will take a high one for the sea-going ship; he at once departs from the principle that he has advocated so long and so persistently, that the great advantage of a turret-ship consists in its lowness and in its smallness; for it must be evident to everybody who has ever considered these subjects for a moment, that when you begin to talk about the lowness of a ship, a very low ship alone enables you to have a small ship; but the moment you determine that your artillery shall be mounted at a considerable height above the water, all the conditions of equilibrium, sea-going, and sea-worthiness demand that you should have at once a high and, therefore, a large ship. There comes in, therefore, at once an objection to which I have never heard a satisfactory reply, to endeavouring to make small turret-ships sea-going, especially when combined with speed; the speed that you can obtain, and the weight that you carry in all ships must necessarily be antagonistic one to the other—that is to say, that you may turn with the greatest ease the weight that you carry on a ship into speed; or *vice versâ*, you may turn that speed into weight by reducing the speed. Those two things are convertible. If, therefore, we are going to have a swift ship on small dimensions, we must sacrifice something; we must either sacrifice some portion of the armour-plating or some portion of the armament, in order to obtain a power to drive the ship at the rate at which she is to go. The two things, the speed and the weight to be carried, are, *cæteris paribus*, perfectly interchangeable. If, therefore, you are going to ask us to construct small turret-ships with low freeboards, you deprive us of the artillery, or rather of the power of placing that artillery in such a manner as to be really efficacious to use, and you deprive us of the power of obtaining great speed. Those difficulties are, to my mind, almost insurmountable, as to the possibility of perfecting a sea-going turret-ship with low freeboard and of small dimensions; but this does not affect the question the least in the world of a turret-ship properly designed of large dimensions and with a high freeboard. The question, then, between the turret-ship and the broadside-ship stands upon an entirely different ground. Now, I must say, as I said when I commenced, I do hope in what I say I shall not give offence, but it is my firm conviction that the great opponent of the turret-system, as applied to sea-going ships, sits in that chair. That may seem extremely odd to many—the greatest opponent to the turret-system as applied to a sea-going and a cruizing ship, is Captain Coles; and for this reason, that, in my judgment, he has advocated impossibilities. He has refused to accept, as a principle of a good sea-going turret-ship that her guns should be high out of the water. He has contended that the true principle of a sea-going turret-ship is to have her guns low in the water. Now, I stand here to advocate that the true principle of a sea-going turret-ship is, that her guns should be high out of the water, and not that they should be low. I have already said that the true principle of a coast defence, the true principle of a piece of siege artillery, the true principle of a ship built to contend, as the Americans fought their actions, in inland

waters, is a low freeboard; but that the true principle of a turret-ship to contend with the waves of the sea, to be a cruizing ship on the ocean, to give accommodation to her men, and to go into action with a certainty of overcoming all her opponents, is in truth a gun high out of the water, and not lowness of freeboard. It is this particular point that is most interesting to me, and that has induced me to come here, and however imperfectly (as I know it must be, however much I may have wearied everybody here) I have endeavoured to point out what I really think is the true philosophy of the turret-system, there is no question of this—that we can do this much—we can mount very heavy guns in our turrets, we can carry those guns at a considerable height out of the water, we can, under certain circumstances, that will occur to everybody, enter into action with another ship with every prospect of success provided we are not restricted by small dimensions; but I do not think that even that much proves, so entirely as I dare say some of the advocates of the turret-system think it proves, that you should build nothing but turret-ships, or that turret-ships alone are sufficient to maintain a Navy like that of England in all the conflicts and all the diversities of service that that Navy would have to go through. I do not think it can, but I am perfectly willing to admit, and I desire to impress upon everybody who hears me, that we are persuaded, and have been persuaded for a long time, that the proper application of the turret-system to a sea-going cruising ship was the exact opposite of what its worthy inventor, its parent I may say, thinks it ought to be. I am sure anybody will understand how difficult, therefore, it has been ever to come to any understanding on the subject. I have the strongest possible belief, founded, I think, on positions that cannot be shaken—that the high gun is essential to a turret-ship; a low gun cannot be used effectively in a sea-way—a low gun could only be fired, as I said before, when the ship is on the top of the sea, and even then, between her and the enemy there may be waves so high—because the height of waves differs in half-a-mile it may be, several waves of one height and several of another—the wave will be between her and the object, and she will not be able to see the object or to strike it; whereas, if the gun were fifteen or twenty feet out of the water, you would look over all those waves and see your object from first to last. When upon the deck of a vessel in a gale of wind, that deck being from fifteen to sixteen feet high, we have all repeatedly seen a vessel within 300 yards of us, disappear, and have seen nothing but his main topsail, but go to the masthead, and there you will never lose sight of him. Although that is an exaggeration of the position I wish to maintain, of the great advantage of the height of the gun, it is an illustration of how necessary it is, in a sea-way, to have a high freeboard and a high sight, all of which complicate the difficulties of constructing a ship in a very remarkable manner. I only wish to refer to one other subject, and it is one which applies not only to what I have now been saying, but it applies to all turret-ships as a general rule. It is a subject of considerable difficulty, and I should not have mentioned it if I had not seen it constantly and persistently overlooked. I am not bringing it forward as an absolute argument against the system, but only as one of the difficulties of the system—as one of the things we have to consider most carefully before we rush headlong into turret-ships. The turret invented by Captain Coles is, as you know, armour-plated above the deck. When it passes through the deck it ceases to be armour-plated, and the whole structure of the turret and the mechanism of the part on which it revolves, is entirely unprotected by armour-plating on itself, though it is defended from anything that may hurt it by the ship's side—that is, by the armour-plating on the ship's side, but it has no other defence. Now, unfortunately—I was going to say, those confounded artillerists, but those terrible artillerists, as soon as ever we contrive to get an armour-plate and some backing of some given strength or another, that resists, for the moment, all their efforts, do invent some horrible gun, and go clean through all our defences. It is very annoying, no doubt, and very provoking, but, however, they will not stop for anything that we can say; we know they do go through 8 inches of armour-plating and a considerable number of other defences. We know that if a shot or a shell passes through a ship's side in direct fire at 200 or 300 yards, that shot or shell striking upon the base, the unarmoured part, of the turret, where all the machinery is, would infallibly bring the whole of that turret to grief. Very little indeed would jamb the turret, and would prevent its

rollers from turning round, and very little indeed, in my opinion, would break through the unarmoured structure of the turret. That is not a fatal, not a vital objection, but it is an objection which people ought to weigh well before they put the whole of their guns into turrets. Recollect, according to the most general scheme that we are acquainted with, two turrets are the most that you find in a ship; therefore it is possible—I do not say it is very likely—but it is possible—that a couple of shot from an enemy's broadside might disable both turrets. Now, what is true of a turret-ship, is undoubtedly true of a broadside-ship; there is no question in the world, that shot and shell will find their way between the guns or above the guns, or into the centre armour-plated battery of any ship, whether turret or broadside. What happens? A certain amount of loss of life in one case, a gun disabled perhaps, but your broadside with six or eight guns on one side, stands the blow, and goes on. You have lost a gun, you have had a gun dismounted, you have a gun's crew killed—you cannot fight without these unpleasant accidents occurring—but you are not utterly disabled; you have still other guns and other men to come forward and carry on the fight, and we know very well most of our actions have been won when we have been half-beaten; but it is another consideration when your two turrets are your whole offence and defence, when you have no other;—one of these shot, or two of these shot passing through—and we know that they will pass through—may utterly disable or jamb the base of your turret and prevent its being used any more. As I said before, I do not the least intend to use that as an argument against the turret system; I only say that it is not all on one side; that there is a great deal to be said on every side of the subject—that it would not be prudent, that it would not be right, to embark the whole of the British Navy, or any considerable portion of it in turret-ships without further experience than we have now had; and I may say this—that so far from there being any disposition on the part of anybody in office or out of office, to my knowledge, to discourage the development of the turret system, very much the contrary is the case. Of course, like a member of the Cabinet, I have no business to retail Cabinet secrets; what passes, therefore, over the way at Whitehall, and the discussions that take place on this subject, of course you will not expect me to say anything at all about, but I think there are evidences which all here must be well acquainted with, that the subject has not only been most carefully considered, but has extremely warm advocates in that council chamber to which I have referred. Certain speeches which have been made in Parliament and elsewhere, certainly prove, I think, at least that there is no unwillingness to consider the turret-ship in all its points and in all its bearings. There is only one thing more I think I may refer to, which I believe was extremely well done by my friend Captain Scott. It is this. I did not hear, as I said, the lecture the other day, but I know that there is a strong desire and a strong feeling to represent the imperfections of broadside ships, as much as they possibly can be represented; and those who think a broadside ship is wrong in principle and wrong in practice, and the turret-ship is right, do well in every possible instance to advocate their opinions fairly, and represent all the evils which belong to the broadside-ships; but what I was going to say is this, there are every day in the broadside-ship improvements made which add enormously to its offensive and defensive character, and which take away many of the objections which are constantly urged against it. I am sure almost everybody in this room is familiar with the talents, with the labour, with the energy, with the unwearied zeal displayed by the Chief Constructor of the Navy in those productions which he has turned out. I think everybody will be aware that he improved the designs of the ships, improved the construction of the ships, and has been in a measure successful to an extent that perhaps it is hardly my province to say. He has shown, in every instance, the greatest possible desire to improve our constructions, his success has been prodigious, and at this moment I speak, having seen the opinions of many persons who have come to this country purposely to investigate our iron-clad ships, who came here with a desire to find fault with our Navy, who came here thoroughly impressed with the beautiful descriptions that the press sometimes gives of our performances, and believing that we were a pack of old women, and that we had no Navy, and were ready to be eaten up whenever they thought proper to open their mouths and swallow us. I have

the means of knowing, from letters that I have seen, that one and all have left this country with the impression that she is unrivalled in her constructions at sea—unrivalled. I am also able to say this one word—that the Assistant Secretary of a foreign Navy was over here for some considerable time, and was asked at a diplomatic dinner the other day, what chance our neighbours would have with us? It is as well not to give you that reply. But he was further asked, "What chance should *we* have with the British Navy?" He answered in these words, "You "have got the finest line of defence on the waters in the world. Nothing "can attack you, and your defence is perfect; but if you attempt to go to "sea, if you attempt to cross the ocean, you would not be six months, before you "would be swept away completely. You have not got a single iron-clad sea-going "ship in your whole Navy;" and he said more—"I went to Chatham the other "day, and the most splendid specimen of naval construction, I ever set my eyes on, "both in design and construction, was the 'Hercules.'" I need not tell you Mr. Reed was the designer and the constructor of the 'Hercules.' I think all this is satisfactory. I am endeavouring, by what I have now said about broadside ships to point out that there is in broadside ships some virtue—that they are not altogether, as we have sometimes heard it said, absolutely out of date. The last construction in broadsides that we have put before the Admiralty, contains one or two features Captain Scott referred to, and which I think are of so much importance, as doing away with the objections generally made to broadside ships, that, at the risk of wearying you a little longer, I will state them. Of course everybody is aware that the great objection made to broadside ships is the want of power to train the gun upon all points of the compass. The great merit of the original idea that came across Captain Coles' brain, was that his turret could be pointed to every part of the compass. But he has been led astray by a will-o'-the-wisp, giving up his first love for something more specious and telling; he has given up that idea, and given up that all round fire, which was so precious to me and to all other consistent advocates of the turret system, and he has now gone in to limiting his fire. I regret it extremely. There is in the "Captain" a want of all that round fire which distinguished his early plans; but I say that the broadside gentlemen—those who are responsible for the construction of broadside ships—have now adopted a plan by which such a ship will command every point of the compass. In addition to those guns in the central battery—which has so often been denominated a box by way of depreciating it—not only have you guns in the box, but upon the upper deck, at a height, as Captain Scott has said, of something like 20 feet out of water, giving you, therefore, a tremendous command over anybody alongside of you, we have put two guns that will fire in a line with the keel and at a right angle to it. I see a gallant officer here—I am very glad to see him here to night—who has persistently advocated that principle in various ways, and who, I have no doubt, will be pleased at the development we have given it; for if we have not absolutely adopted all his recommendations, we have profited very much indeed by the lessons he has given us. We have got that fire, that fore and aft fire, which is to him so extremely precious, and which he has been for a very long time, not only a theoretical advocate for giving, but has in the ships whose construction he has directed, adopted with the utmost ability. It is satisfactory to be able publicly to say that that officer, Captain Symonds, has at all times, in many ways, contributed to us a vast amount of useful information—that he has put his models and his plans very often, indeed, at our disposal, and given us the benefit, and a very great benefit it is—of his talents, and of the attention he has paid to that subject. There is but one thing more, on the subject of broadsides. I am extremely sorry to have detained you so long, but I should not do justice to what I have to say, if I did not revert to this one point. The heavy gun in a broadside can only be worked by mechanical means. When, in 1863, the fact became evident that heavy guns would really succeed—(as everybody here knows, there was considerable doubt for some time—gun after gun burst—and those who were responsible for the adoption of ships to carry those guns were naturally staggered for a considerable time, and began to have a little doubt whether the big gun—the rifled gun—would stand the severe shocks it was exposed to, and would ever be a gun served out to the Navy for use:)—but in 1863, my friend Mr. Reed, with that prescient foresight

about naval matters, which we have always known him to possess, and which is invaluable to a person in the official capacity that he holds, became thoroughly convinced that 12-ton guns would not only exist, but be mounted and worked in the broadside ships. At that time, I remember perfectly well, there came a number of naval officers to the council, that I have spoken to you about, and there was a great discussion, and the opinion given by all the naval officers was, that only a 5-ton gun could be worked upon a broadside ship. Now, it required some courage, and some knowledge of mechanism, and some confidence in his own resources, and in his own good sense, to induce Mr. Reed to say, I will build a ship, and she shall carry 12-ton guns to work on the broadside. And now came the question, how we were to work those guns. It was clear the plan of working a gun by handspikes would not do; for a long time it was persistently attempted to work these 12-ton guns on the broadside with tackles and handspikes, but there came upon the scene somebody who changed all that. I am happy to introduce Captain Scott as the person to whom we owe the change that has now taken place, in the opinion of all naval officers—a change, from the idea of its being absolutely impossible to work 12-ton guns on the broadside, to the conviction that it is the easiest thing in the world.—It is simply by the application of mechanism, and the mechanical foresight of Captain Scott, with an assiduity and a labour equal to the assiduity and labour which Captain Coles has bestowed upon his turret-ship, that he has worked out a system by which the heaviest guns are worked at sea, not only with as much facility, but with greater facility than the old 68-pounder on its gun-carriage. I am happy to say, that this is now a recognised fact. It required many trials and much perseverance on Captain Scott's part—it required a man whose temper was such, that he would take no denial; that he would work on in spite of all discouragement, and he has done so. The other day, I am happy to say, I read a report from a Rear-Admiral and five Naval Officers (a committee for mounting and working naval guns), who declared the difficulty was over, and that heavy guns could be worked on the broadside with perfect facility. The burden of what I have to say is this—pointing out the difficulty of getting a sea-going ship as a turret-ship with a low freeboard, pointing out the inevitable and insuperable objections to such a ship, and showing, as I think I have shown, the great facilities that now exist for mounting heavy guns on the broadside principle,—I think I have put the question on a fairer and more rational basis than it has yet stood upon. I think I have shown—or, at least, I hope I have shown, to this meeting, that it is perfectly possible to have the very best defence, and the very best siege artillery you can have in low turret-ships; that it is possible to have a sea-going turret-ship, provided you will give up the low freeboard, but that there is no reason whatever for supposing that the lately designed broadside ship mounting heavy guns upon its broadside by mechanical means shall not go into action with a turret-ship with equal chances, and that it is skill, nerve, resolution, whatever you please, that would decide that action.

Captain TYLER: I think we must all thank Admiral Robinson for the very able way in which he has spoken upon this occasion. Captain Coles gave us, with great ability, his side of the question, and we have now heard from the highest authority the other side of the question, in a manner with which, I think, we must all be charmed—in consequence of the impartiality and kindness with which Admiral Robinson has spoken of everybody concerned. Sitting opposite to this model, I have been watching it as Admiral Robinson spoke, and I have been struck with it as a most excellent illustration of what he has been telling us. Comparing *this* broadside vessel with this turret-ship, as a sea-going vessel, it struck me at once that, in order to arrive from the one vessel to the other vessel [pointing], you have to take a slice out of the former vessel on one side, and another slice out of the other side, and you pretty nearly equalize the two sections. As to the height of the gun out of the water, Captain Coles has said, that he can make the turret-ship gun the same height out of the water as the broadside-ship gun.

Captain COLES: I think you will find that it is about the same.

Captain TYLER: It appears to be about the same on the diagram.

Admiral ROBINSON: The very principle we contend for is that the guns should be high, and not low.

Captain TYLER: At all events, in this diagram it would appear the height is about the same; and as I said before, I do not see any reason why it should not be the same. If it is not so, it might be made so; but then there is no doubt this disadvantage, that the gun being withdrawn (and that is the principle of the turret-ship, that the gun is withdrawn) from the side of the vessel, it cannot certainly fire as directly upon the water as the broadside gun can.

Captain COLES: That gun can give seven degrees of depression, the same as the broadside.

Captain TYLER: It cannot possibly give the same as the broadside,

Captain COLES: Yes it can, it can be set to that angle of seven degrees.

Captain TYLER: I do not know what the angle is; at all events, if the gun comes a little within this point, it will fire upon the deck, that is obvious.

Captain COLES: No broadside can depress more than seven degrees.

The CHAIRMAN: You will have an opportunity of noticing the point in reply.

Captain TYLER: At all events it would appear, at first sight that the turret vessel would be a very uncomfortable vessel to go to sea in, as compared with the broadside vessel, there seems to be so very little room to move about in it. A great part of the narrow space is taken up by the turrets, and the remainder is unarmoured. Now the colour of the model struck me with the idea that, possibly, if a vessel of that description went into action, the first thing her enemies would endeavour to do would be to set fire to the wooden unarmoured part; and I apprehend, if the wooden unarmoured part were to be set in a blaze, it would be quite impossible to inhabit this turret-ship.

Captain COLES: This is all iron.

Captain TYLER: If that is all iron, it clearly will not burn, and my objection falls to the ground. Then it seems to me, with these turrets, two, or three, or four, as the case may be, it will be a very awkward thing indeed if a gun burst in a turret. Guns are liable to burst, and if a gun bursts in a broadside vessel it does a certain amount of damage, more or less, and the vessel is not disabled. But if a gun bursts in a turret, it becomes a very awkward thing indeed; at all events, that turret is disabled, and you have lost a half or one-third of your fighting power at once. Those are the principal objections that struck me, as I listened to this discussion; and I will not detain the meeting, not being a professional man, by any further remarks upon the subject.

Mr. BELL GALLOWAY: Mr. Chairman and Gentlemen, the subject under consideration is, as has already been stated, an all-important national one. It is a subject that has occupied my attention and study for about twelve years, and during that time I have been in correspondence with the Admiralty. My name is very well known there; and I am very happy to-night to meet the Controller of the Admiralty for the first time.

The CHAIRMAN: Will you kindly keep to the subject?

Mr. GALLOWAY: I beg to apologise. The subject-matter to-night is, whether is the turret principle or the broadside principle most valuable for the protection of our country? It has been properly said, and here I perfectly agree with the honourable gentleman, that each system has its advantages for particular purposes. In plain terms, I say, as a working man, we can do almost anything with two kinds of tools, but one is better adapted for the doing of work than the other may be. There is, however, a happy medium, and I contend for the medium thus. If we want, as I have said in another place, a perfect fighting ship, we shall be able best to attain that object by the combination of the two principles, namely, a fighting ship, part turret and part broadside. That can be done, and it might be well—and here I speak submissively—if the Admiralty would let but one of the old ships that has been sold, according to the statement made last night, at £2 16*s.* per ton, scarce the price of an old collier that is working between London and Newcastle—if but one of these ships could be placed at the disposal of Captain Coles and another party, who would gladly work with him, it would develope practically the truth of what I am now saying. I submit, and I speak respectfully in this assembly, that there is a consideration of the most paramount importance connected with our ships, besides the means of protection.

What would be the position of a ship of war during an engagement? I put it thus, what would be the position of a ship of war during an engagement from the effect of shot striking those heavy armoured plates, and then, by concussion and vibration, starting the rivets. I submit that your ship would be nothing more or less than a coffin for every soul on board, and I say that there exist means of preventing such a catastrophe in the application of the cellular principle of construction of armour, which ought to have been applied ere we had come to this state of things. Then, again, what would be the position of our ships of war, during the first engagement from the effect of any one shot—(and there would be new fighting tactics)—disabling the progress of that ship, by disabling the action of your screw propeller or rudder? What would be the position of the ship then? It would be simply a target to be shot at. And then, again, is it not a strange anomaly that there are actually plans existing.—(Question). I know of no more vital question.

The CHAIRMAN: These are questions not raised in the paper. This is not discussing the paper.

Mr. GALLOWAY: Two minutes more, and I shall have done. In all places and under all circumstances I will bow to order; but whatever may be the opinion of gentlemen here with respect to questions, the vitality of every question consists in the effectiveness of the Navy, upon which hang the destinies of our country; that is the all important question. With this one question I will close my remarks: How is it, and why is it that we have a Navy which is deplored in high circles? Even Sir John Pakington, in the House, admitted that it was not in the state of efficiency in which it ought to be. Now if there be plans, why, in the name of common sense, justice, and humanity, are those plans not applied to save thousands of lives, and the honour of our country?

Captain HEATHORN, R.A.: I wish to say one thing, which I do not think anybody has before mentioned in connection with the turret system, and that is, that you get a great amount of top purchase and rear purchase in a turret for your working gear. We know, now that shot and cartridges are beyond a man's handling (from their very large size and weight), that mechanical arrangements for lifting them are necessary, and it is important to those who have to scheme out the working of heavy guns, to have strong purchases both above and abaft a gun, as rigid bearings for running in and out gear, as well as for shot-lifting. In the turret system the whole arrangement of guns and turret revolving together, these bearings are always in the same relative positions with the gun. I have been engaged in sketching out the interior workings of some turrets, and this has been one of my greatest considerations, viz., to get all the bearings for working heavy weights always in the same relative positions. It is not necessary for a turret embrasure to be low, although a turret may be low, because on any scheme of muzzle-pivoting there is no difficulty in so arranging that every degree of elevation in that gun can allow the body of the gun to be below the embrasure; and although to raise the gun to positions of depression, it will have to be a little above the level of the port, the gun will usually be lower in the turret than the horizontal line of the embrasure.

Captain COLES: I am sure it affords me the greatest pleasure to have to reply after the very courteous way in which I may say the turret system *has not been attacked*, for I think generally, almost the whole of the arguments used last night, on the main points are admitted. As regards Mr. Reed, no one is so much pleased as I am to find that whatever he may have been, and into that question I will not enter, he is now a supporter of the turret system; and that he may be considered after his speech of last night, to have finally joined the "innovators," as he honoured us by calling us. His position, no doubt, precluded him from any attack upon any of the main arguments addressed by me, to show the superior advantages of the turret system over the broadside, for heavy ordnance. I will refer very shortly to the incidental points touched on by Mr. Reed. But, first, let me tell him, as regards my British sailors in the diagram, they are correctly drawn, and measure 5 feet 8 inches in height, on a quarter of an inch scale, and that the illustration they afforded my argument, was equally fair at both ports. I anticipated such a remark from past experience, Mr. Reed having made the same remark with regard to that diagram of rolling in 1863, which, by the Admiral's re-

port that I read last night, has only proved too true. I made both set of men exactly the same size. One would really have thought, from his criticisms on the height, that he, as a ship-builder, was not aware that the deck on which the sailor stands, was lower than the port-sill. As for the plating below water, I have not gone backwards in reducing that plating below water. I have shown that the low free-board will not roll a reduced quantity of armour out of water, and thus expose the unprotected part. Therefore to have added the additional quantity, would have been the surest bungling, if I may so call it. It would have been to make the country pay for an extra quantity of sheathing, to injure the qualities of the ship. At the same time, I should add in explanation, that the "Captain" has three feet less beam than the "Bellerophon;" and for that reason only requires somewhat less plating. As regards the comparative cost of the "Bellerophon" and the "Captain;" I will not go further into the Dockyard mystery of the charge for plant; for if Mr. Reed, with his official experience, thinks the mystery unfathomable, I am quite ready to put it down as one of those things which "no fellow can understand." At the same time, as the interest on contractors' plant must enter fully into the cost of the "Captain," I really do not see that the figures I have shown have been erroneous. It was £430,495, the cost of the "Bellerophon," (though the accounts are not made up, not complete,) and the cost of the "Captain," was £335,000. I stated, as you may remember, in both cases, that the accounts were not yet completed. As regards the statement, that the "Bellerophon" only had two guns:—what is stated in the Report is that the "Bellerophon" only fired two shot. Well, Mr. Reed states, and no doubt correctly, that she had but two guns, and fired one round from each. She might, of course, have fired the prescribed number of rounds from each of those guns, if it had been thought safe. Admiral Warden's Report says:—"We could "have opened all the main deck ports, but judging by the effect of opening only "five, it would have been to have washed the men away from the guns."

Mr. REED: Excuse me, that is not the "Bellerophon."

Captain COLES: It was with the "Lord Clyde;" therefore, the "Bellerophon" had apparently a great advantage, in this little broadside difficulty, in having, at all events, four-fifths of her ports, clearly closed against the water. As regards the relative power of stowing extra coal in the "Bellerophon" and "Captain," Mr. Reed says it is, at least, equal, or, if anything, greater in the "Bellerophon," than in the "Captain." But, according to the plan of accommodation and battery of the two ships, it may be proved, if time would admit, that this could not be so. It could be stowed in the "Captain"—on the deck below, between the two turrets—without interfering with the accommodation necessary for the complement of 400 men; or with the battery, or the trim of the ship, as it would be in the centre of the vessel. Whereas, in the "Bellerophon," it could not be stowed in the centre without blocking up her guns; nor at the ends, without interfering materially with the requisite accommodation for her complement of 556 men; or, with the trim of the ship; because you would have to stow it either before or abaft the battery. Having thus noticed those points to which Mr. Reed seemed to attach importance, I must add that on the general question between turrets and broadsides, they are comparatively unimportant. Assume for the sake of argument, that the "Bellerophon" is the very best broadside ship that money or skill can produce, and that she will at all times have an efficient supply of water-tight cartridges, of what use would she be against a good turret-ship, if she cannot open her ports with safety in a good swell? and if she is liable to have her fighting crew disabled by the entry of only one 300-pound shell through any one of her ports, into her square box? However, now that she is built, I trust she will be as successful as her designer can possibly desire, Now, as to the "Wyvern," which has been quoted as a turret-ship on this occasion in the Admiral's reports, I very fully stated in my lecture the reason why she should not be considered a sea-going turret-ship. I said, as it is, the "Wivern," without the requisite addition, has been used to disparage the favourable conclusions as to the turret system arrived at by both Admirals and it is curious that the only remark Mr. Reed made in apparent or partial disparagement of that system was founded upon that very "Wyvern," and upon the assumption of her being a fair representation of a sea-going turret-ship. I agree with Mr. Reed, that it is not fair to quote

from a report only that which is in one's favour; and if I had admitted the "Wyvern" to be a reasonably fair representation of a sea-going turret ship, I should of course have quoted every word of the report which related to her. As I do not so consider her, and as early as 1864 wrote to the Secretary of the Admiralty to that effect, I think I was entitled without unfairness to read only such parts of the printed report as related to broadside ships, admitted to be good specimens of their respective classes, and to leave to others, if they thought it worth while to rest their defence of the broadside vessels, as Mr. Reed seemed inclined to do, upon the comparison with the "Wyvern." I think this also may answer Captain Scott upon that point. As regards the effects of a low freeboard upon rolling, Mr. Reed admits that up to a certain height the low freeboard has that effect. The only question between us, therefore, is one of degree. In the suggested comparison I made of the two vessels, you will remember that at the first they both rolled 20 degrees, their guns being assumed to be the same height above the water, and in that case the turret gun was not, and the broadside gun was, in the water. I think that is clearly shown. Then I assume the low free board would roll only 7 degrees to the broad side rolling 20 degrees. I assume that; it is part of my argument that the low freeboard rolls less, which is also partly admitted. Mr. Reed would admit that this will be true up to a certain height of freeboard. Here again the question between us is one of degree. Time will not admit of my answering every point, but I will try and answer a few. Captain Scott gave us a very interesting sketch of gun-carriages, and also of rolling and so on. With regard to the "Wyvern," I think that is already answered. With regard to the gun-carriages, he spoke of the exercise at some of these trials being made with old carriages. He should have stated that the gun-carriages in the "Royal Sovereign" were wooden carriages, and more or less defective; and, what is more, they were not fitted with the appliances which I had asked for, namely, the winches to run in and out. We heard the Controller of the Navy ably describe how necessary it was to have mechanical appliances to run the gun in and out. Now on this occasion, when these guns in the "Royal Sovereign" were fired, those winches were not applied, and they had the old carriages that had been condemned by Captain Osborn in 1864. But even then you see we fired at the rate of one round in 1 minute and 23 seconds. Now, Captain Scott quoted some other firing, and admitted that they did not fire at a mark. The report of Captain Key on this occasion goes on to say: "In both cases,"—the cases of the turret gun—a report upon the "Royal Sovereign," that is the double and single turret—"in both cases a small target was "fired at 1,000 yards distance, and good practice made." Now I contend that if Captain Scott's quotation was of a gun, not fired at a mark, but of quick firing, it was no criterion at all, for the very essence of the turret system is the power of taking aim, and the power of seeing your enemy. It is a fact, and has always been known, that in broadside ports it is very difficult to see the object, particularly when it is moving, and this difficulty accounts in a great degree for the slowness of firing on that occasion, when, as Admiral Warden says, it took him three-quarters of an hour to fire 15 rounds. The quick firing of the "Bellerophon's" guns, which Captain Scott mentioned, I think is also answered by the consideration that they were not fired at a mark. One thing mentioned by Captain Scott was the rushing of the sea into the port, and he explained that you could shut the port up; but if you shut the port up, as every gunner knows, and you only have the little hole for the rammer to go in and out of, we all know that it is a very much slower process to load; and not only that, but during the whole of that time, the captain of the gun can see nothing whatever. He has to wait until the port is up, to know if his enemy happens to be near. He has to search for his enemy; he has to go right and left of the port; and, as we know, it is very difficult to see the enemy at all; and you are obliged to send an order from the upper deck, and then very often turn your ship to find your enemy. Another thing was, that the gun-carriages upon which the experiments were made, referred to by Captain Scott, I believe were of iron, were they not?

Captain SCOTT: Certainly. As you have questioned me, I may state I have not quoted the "Royal Alfred's" firing, which was with iron carriages, but there was no increase of quickness over that from wooden carriages—none whatever in firing.

Captain COLES: At all events those carriages were of iron. I now have the honour of answering the Controller of the Navy, and it is with great diffidence that I do answer an Officer who has done so much for the Navy, and who holds such a distinguished position in the Admiralty. I believe that one of the first things the Controller mentioned was, that in smooth water he considered the turret principle was the greatest weapon of offence and defence—that is, as long as the ship is steady, and that is the pith of the whole thing. I have contended, and I do contend, that low freeboard is what will enable you to keep the ship comparatively more steady than by any other means. That is the present question. It is a matter of degree to what extent you carry it. Another point the Controller of the Navy mentioned was, that the turret gun, not being high out of the water, waves 13 feet high, interposed between the gunner and the enemy, would prevent his seeing the enemy, or prevent a shot hitting the enemy; but as the "Bellerophon's" gun is not 13 feet out of the water, the same thing would occur with her.

Admiral ROBINSON: I stated the figure. I stated the height of the gun being 5 feet in one case, and the interposing wave 13 feet. If you wish to draw a comparison with the "Bellerophon"—

The CHAIRMAN: You did not hear that Captain Coles said, that the "Captain's" guns, which is a ship approximating in size to the "Bellerophon," are 11 feet 6 inches out of the water.

Admiral ROBINSON: I thought he was quoting what I had said.

Captain COLES: I was quoting the height of the wave. In fact, I think I had not explained myself. The wave is 13 feet high, so that any broadside ship, with a gun less than 13 feet out of water (and I do not think any broadside ships have their guns 13 feet out of the water)—any ship with a gun less than 13 feet out of the water would have such a wave interposed between the gun and the object. But with regard to a difference as to the height of the gun out of the water; I think it may have escaped the Controller's memory at the moment, he seems to think that our great difference of opinion was about the height out of the water of these turret-ships, but it will be found that I have proposed, and do propose, vessels of all descriptions and heights out of water. For instance, you will see here a high freeboard, and different ways of mounting turrets have been sent to the Admiralty. *Here* is a turret mounted on a pivot going down to the lower deck; *here* is a turret on a circular box, on purpose to give her a high freeboard. *Here* is a ship, the first sea-going ship drawn out by Mr. Barnaby, No. 4; she has a square box in the centre, on purpose to give a high freeboard. That ship's guns are higher than most ships, they were 13 feet out of water. That ship was proposed by me, and drawn out in the Controller's office in 1863. The "Royal Sovereign's" guns are 12 feet out of water. The "Naughty Child"—a vessel sent in in 1863—her guns were 10 feet out of water. The turret-ship designed in 1863 I have noticed. The "Captain" is 11 feet 6 inches out of water. So that it is a mere matter of degree how high you have your gun out of water, and, of course, your freeboard, it may be supposed, is governed by that. But it is not so in a turret-ship. You can have a low freeboard and a gun a great height out of the water, as much as 11 feet or even more. You have only, as I have explained, to slope the deck considerably, as you see there; I merely raise the turret a little, and get my gun higher. Instead of that, if you wish to get a gun higher out of water in a broadside ship, you have to increase the height of your broadside ship, and to increase all that extra weight. I have only to increase the height and the small weight of the cylinder of the turret. On this point, I think the Controller said we have not been able to come to any decision in these turret-ships. But I hope I may be allowed to say that, with all the various propositions which I have sent in from time to time, the Controller had a great many specimens before him, and it did not rest with me whether a ship of that sort was built or not; I had only to give my plans, and it rested with the Controller's department. I merely made suggestions. I did not prevent ships from being built, and therefore I cannot quite see that I have been the stopper to the sea-going ships, when I see all these different classes proposed by me. But, again, how is it, if I have been the stopper to building sea-going ships, how is it that sea-going turret-ships, built at private yards, have crossed the Atlantic, when

we have not a sea-going ship in the Navy. Now, Gentlemen, a letter was put into my hand, which, if you will allow me, I will read, and I think it will be very interesting. It is written to me by an officer of distinction in the Peruvian Navy :—

"London, 1st May, 1867.

"Captain Coles, R.N.

"Sir—As you are giving a lecture on turret-ships, perhaps you would like to have "the following particulars of the turret-ship 'Huascar,' which was built under my "direction for the Peruvian Government, by Messrs. Laird Brothers, and taken out "by me to Peru.

"In the report addressed by Commander Garcia, commanding officer of the Peru- "vian ironclad frigate 'Independencia,' to the head department of the Navy, on his "voyage from Europe to the Pacific, in convoy with my ship the 'Huascar' (carry- "ing the Commodore's flag) and the wooden corvette 'America,' the following extract "from that report is to be found inserted in the newspaper *El Comercio*, dated the "24th of August, 1866 :—

"'On our arrival to the Pacific, the barometer began to fall with admirable "'rapidity, and as it was blowing hard from the N.W., we did not doubt we were "'going to meet one of those heavy gales so frequent in those latitudes. The "'weather, until then cloudy and rainy, began to appear stormy on the 30th and "'31st of May. This last day we met a very strong northern, which, changing "'suddenly into N.W., became a violent and protracted storm, accompanied with "'hurricane squalls. As it was impossible, under these circumstances, to steer "'the ship's course, mainly by the terrible broadside swell which was rising, we "'were lying to with fore staysail and trysails, steaming under very easy steam, "'to enable us to put the bows to the sea. Although the storm's strength did "'not allow us to carry more sail than that which we carried, we were obliged to "'set the topsails under the close reef, as the only remedy to check the extra- "'ordinary rolling of the ship, which exceeded in many cases 30° on each "'side.'

"Notwithstanding losing the convoy of the 'Independencia' and the 'America,' I "had so much confidence in the 'Huascar' that I made my direct course for Chiloe, "and arrived there at 9 A.M. on 6th June, the 'America' the next day at 11 A.M., "and the 'Independencia' at 2 P.M. the same day, that is, 29 hours after the "'Huascar.'

"I may add that the 'Huascar' is 1100 tons, carrying two 12½-ton guns in her "turret, and two 40-pounders aft on deck, and that she was very buoyant and a good "sea-boat. The 'Independencia' is a broadside box ironclad, of upwards of 2,000 "tons and 550-horse power, not carrying any gun heavier than 150-pounders.

"I am, Sir,

"Your obedient servant,

"JOSE M. SALCEDO.

"P.S.—We left Chiloe on the 11th June for Valparaiso, and met the same night "a severe gale, when we again parted company with the 'Independencia,' but "arrived at Valparaiso on the 15th, the 'Independencia' not arriving until the next "day."

That was the first ironclad ship that went across the Atlantic, and that gentleman, I believe, is present here to-night, and I have no doubt he will tell you, if you wish it, with his own mouth, that that vessel was a beautiful little sea boat; her deck was six feet out of the water. So much for the sea-going qualities of turret-ships. The Controller says that the turret-gun is unprotected between decks; that is that the turret is only protected by the ship's side. That is one of my very great arguments in favour of low freeboard. Suppose, for instance, that a ship's side is ten feet out of water, and it is covered with six-inch iron, if you reduce that portion to five feet, it is evident you can double the iron on that portion which would make it one foot of iron. So that if that is the case in low freeboard, that is another great reason why you should adopt it. And again, if the turret-guns are unpro-

tected, are not the guns of a broadside-ship much more unprotected, where you have the very much higher side, and, as we find, a very much thinner side in proportion, with all these numerous port-holes for the entry of shell, and, I think, you all know that the entry of one shell in such a casemated battery as the "Bellerophon" would be quite sufficient to put that ship *hors de combat*; at all events for some time—shells with 12-pound charges. Another objection was that the all-round fire of the "Captain" had been sacrificed. It has been sacrificed to a certain point. That is, we can fire the 600-pounder within six degrees of the line of the keel. Now, is there any other ship in the service that could fire the 300-pounder at the same angle? They may fire their smaller guns by poking them out of the port-holes in the bow, but they will not be able to fight those guns steaming against a head sea, whereas the gun in the turret-ship being well placed, can, when steaming that ship against a head sea, still be firing nearly right ahead. I think, gentlemen, nothing can be more satisfactory, or more kind, than what the Controller has said. There is, however, one point more. It was mentioned that a gun bursting in a turret would do very great damage, but I must remind you, that the gun or a shell bursting, or anything bursting in a turret, is just where it would have the advantage over a broadside-ship. If the gun bursts in a broadside-ship it creates a panic on the whole of that deck, and may not only kill the crew of that gun, but the crew of the gun next to it; whereas a gun bursting in a turret is localised to that particular point, to that one turret. Perhaps if the gun burst here, you would lose the power of one turret of two guns, but if a gun burst on that deck most likely the whole deck would be put *hors de combat*, particularly with these 40-pound charges. In fact that is one of the great points that are pointed out as an advantage in the turret by Captain Powell in his report of 1861. I will not trouble you by reading that report, as I think I read it last night, but it says that one of the great advantages is, that if a shell burst in the turret, or a gun burst, it would be localised to that particular turret. There is yet one other point that I will refer to. The Controller said, and I was very glad indeed to hear it, that he had always been a great advocate of the turret, and is so now, for special purposes. Well, Gentlemen, it has given me the greatest pleasure, nothing could have been more satisfactory, for what did I say last night? I think you will find that I particularly pointed out that, as a rule, special vessels must be built for special purposes where armour is involved, but that the turn-table and shield which combine to form my turrets, admit of war ships being constructed which can serve for more general purposes than the broadside principle admits of. "For instance, vessels capable of the defence of our shores," that is the very first thing, I think, the Controller of the Navy was pleased to grant to the turret-system, "or colonies, fit for the close attack "of an enemy's strongholds, carrying the heaviest cannon that we can manufacture, "and yet capable of crossing the widest ocean, can only to-day be found in existing "vessels with a very low freeboard and turrets." I think upon that point we may consider that we have no longer the slightest difference of opinion. I do not know whether there are any other particular points which I may be called upon, or which it is necessary to answer, but I think I have touched generally upon all. I can only conclude by saying, that this lecture and discussion, however much trouble they may have caused me, have been an immense pleasure to me, not only because I consider that, to a very great extent, the turret principle is admitted to be right, but I have found, and am happy to see, that there is such a great disposition and such a great effort that our Navy should benefit by it. It only remains with me to thank you, and to thank the Controller, and all of those gentlemen who have contributed to the information which I have gained, and which it has been my purpose to gain in laying my views before others. I still think and feel, as I say, that for special purposes you must have different vessels. As I mentioned last night, those vessels with very low freeboard, whose sails were left out, are not meant for sailing, they are only meant for steam-power, and with regard to the whole of those vessels, my opinions are very much strengthened by what I have heard. I hope, gentlemen, that we shall not only hear of other vessels crossing the Atlantic, but that we shall soon have turret-ships to do the same.

A VISITOR: I am requested by Capt. Salcedo, as he does not understand English

very well, to translate for him, and he will have much pleasure in answering any question put to him about the "Huascar."

The CHAIRMAN: Can you say what is the thickness of the armour-plating?

A VISITOR: Four inches and a-half armour-plating.

The CHAIRMAN: What was the size of the vessel?

Captain COLES: I can give you all the information.

The CHAIRMAN: At this late hour, perhaps it is hardly necessary for me to add anything. I should like to have made some remarks, but at this late hour it is not desirable. It must be remembered that the condition of the turret and broadside question is very different now to what it was when it was enunciated by Captain Coles, and I must say that I think the present position of the matter is very much owing to the persistent and talented way in which he has prosecuted his work under very great disadvantages. He has already stated to you that we have not got a turret-vessel in his estimation such as would afford us the information that we really require to enable us to come to anything like a satisfactory conclusion as to the relative merits of the two systems, and I do think that the burden that has been laid upon the "Wyvern" is too great, and is not at all such as would warrant any comparison whatever between her and "Bellerophon." She is a very small ship; you cannot make any real comparison, unless the two ships are similar in size. It is quite out of the question. It is quite clear the main principle of the turret system, that is, the idea that Capt. Coles has, that a low freeboard will produce an easy vessel, a vessel that would not roll much, is admitted by Mr. Reed very justly. I quite endorse his opinion that it would have that effect. I also endorse his opinion that if the freeboard were high, in proportion as it were high, it would do away with the advantage which had been originally contemplated by Captain Coles, and the vessel would be in that proportion uneasy. Therefore the statement of the Admiral that if the vessels had had their guns a certain height in the turret-ship that they would have had great advantages over the broadside ships — Captain Scott did not quote correctly—I beg his pardon, he quoted correctly, but I do not think he interpreted it correctly, because the latter clause of the quotation clearly implied that the Admiral was speaking of the height of the gun, and not the height of the freeboard. Now as the principle of the turret system is to have a low freeboard for the purpose of getting an easy ship, it would have been destroyed by having a high one; therefore, if the gun is high, that is all that is really wanted. You have a high gun, a low freeboard, and you get an easy ship. Now, I believe, a combination of the two systems would make a far better one. I am quite sure that the old system of French ships was a very wise system. It was discontinued in great measure because of the necessity of having more space on the decks for larger guns. Now you are introducing that which undoubtedly is due to Captain Coles, and that is the turn-table, and that practically is a long approach towards his system, and certainly he is entitled to the full and undoubted credit of that. I do not think that you could have fought the large guns with advantage, or with safety if you did not use the turn-table. Therefore that is of very great importance, and I do think the fact of his having introduced the turret and the turn-table, has led very much to a more early adoption of large guns into the Navy. I quite feel, too, that the discussion on the turret system will lead to what I believe to be essential in easy ships, and that is, narrower ships than we have. With respect to the uneasiness and the difficulty of those ships firing their guns, Captain Scott says, it was a defect of the carriages, but why were the carriages so defective? Because the sudden, the rapid, and extensive motions of the ships, required more than ordinary skill and care of mechanical construction. With respect to the construction of those carriages, I say, the very failure of the carriages, while it obliges you to get a more effective carriage, also ought to point out a defect in the ship, either in the stowage arrangement, or construction, or form, I cannot say which. It is, no doubt, a very complex question, and one not easily dealt with, but as attention does overcome difficulties that ought to be overcome, it is essential that it should be overcome, and I do not believe that there is any insuperable difficulty in overcoming it. There are advantages in the turret system which I think are very decided with respect to the gun and to pointing of the gun,

and I must say until this discussion took place, I was not aware it had so many advantages as it has. Of course we are not prepared to say, that it has perhaps the extreme advantages claimed for it by Captain Coles, or that the broadside system has the extreme disadvantages. However, I accept, and I think we all agree to that, that there are specialties, and you must have particular ships for them. You cannot say you will have all turrets, and you cannot have all broadsides. But what is really wanted is, that we shall all put our heads together and agree to work together, as we have a common object, a common end, a common interest, and each accepting opinions and ideas one from the other, borrowing not stealing, giving credit where credit is due, and honor where honor is due. I think you will allow me to return your thanks to Captain Coles for his very clever, and very ingenious principle, and I am sure if he had not had a more than ordinary mechanical genius he could not have overcome the difficulties that he has had to contend with, and he would not have brought it to the perfection he has. On the other hand, we must give credit to the Departments who are going in the direction of recognizing the principle distinctly, and of frankly avowing the value of that principle, and are adopting it so far as they conceive consistent, and of course every man in a position of trust and responsibility, must exercise his own judgment, he must not accept another man's judgment. He is responsible, and of course as he is responsible, he must exercise his own judgment in the matter. I have much pleasure, Captain Coles, in returning you the thanks of the meeting.

Evening Meeting.

Monday, May 13th, 1867.

ADMIRAL THE RIGHT HON. THE EARL OF SHREWSBURY AND TALBOT, C.B., in the Chair.

NAMES OF MEMBERS who joined the Institution between May 6th and May 13th, 1867.

ANNUAL.

Barton, William, Capt., late Gr. Gds.
Keyes, C. P., C.B., Lt.-Col. Mad. Staff Corps, Commt., 1st Punjab Infy. 1*l.*
Ommanney, M. F., Lieut. R.E.
Fosbery, W. T. E., Capt. h.-p., 77th Regt. 1*l.*
St. Clair, Hon. Archibald, Comr. R.N. 1*l.*

THE COMBINED "END-ON" AND BROADSIDE PRINCIPLE.

By Captain T. E. SYMONDS, R.N.

BEFORE commencing my paper, I have to express my regret to hear that Captain Coles will not be present this evening. I informed him, as did also the Secretary, of my intention of reading this paper "On the Combined *End-on and Broadside Principle*," as opposed to *the Turret Principle*, and I had hoped to have had the pleasure of seeing him here this evening to reply to any criticisms I might make on his views.

There are, I believe, few accounts of Naval Battles on record, whether between fleets, single ships, or ships and land defences, in which the value of end-on fire has not been more or less apparent; and there are few Naval Officers who have been employed in chasing pirates—slavers—or in battles with a more powerful enemy, who have not felt the great practical disadvantage of not having a gun always ready to fire clear of obstructions, *end-on*, either ahead or astern.

The escape of many a chase, and the history of many a disaster, may be attributed to the absence of this great desideratum in war vessels of every class. It was severely felt in the old war, especially when acting in-shore against gun-boats and land batteries, for instance

*** The diagrams and models referred to may be seen at No. 10, Adam Street, Adelphi, London.—T. E. S.

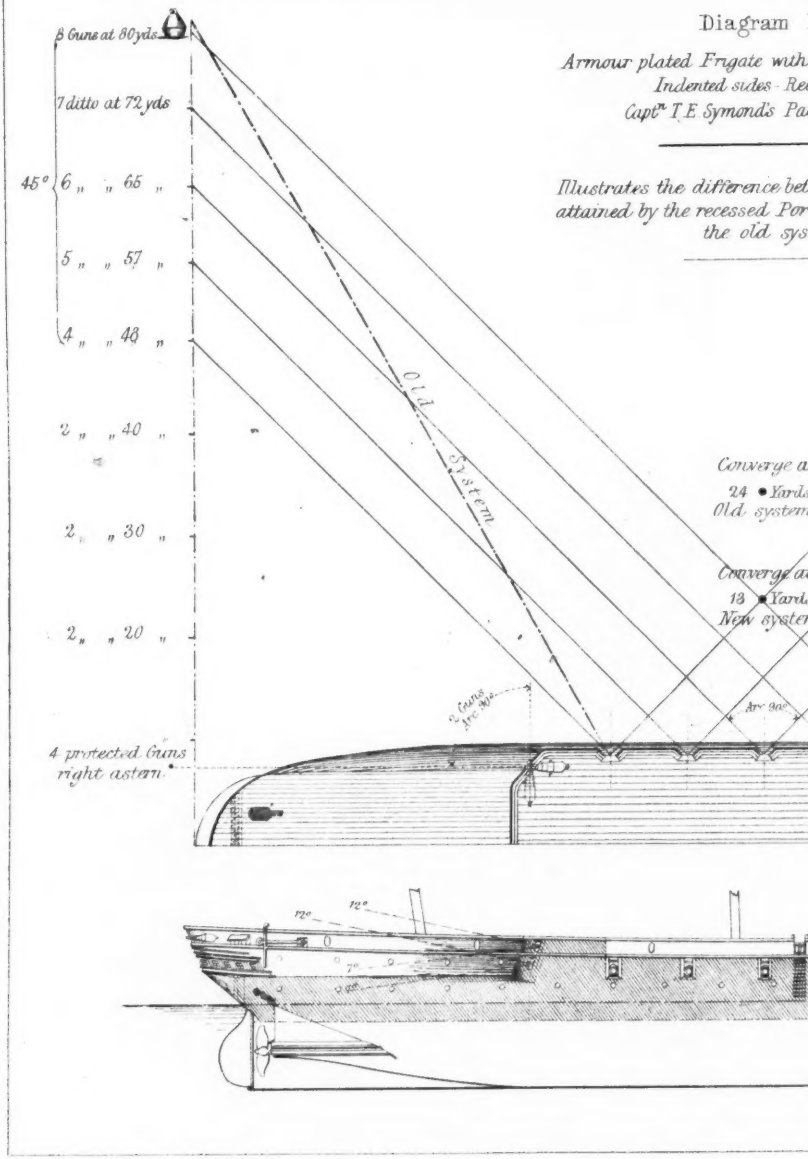
the "Dictator," Captain Stewart, and the "Melpomene," Captain Warren, in action with the Danes, and there have been several illustrations of it in more recent operations in the Russian and Chinese wars; one instance with which we are all familiar is the case of the "Teazer," in the attack on Lagos, when yawing to bring her guns to bear, she was swept out of her course, and took the ground.

That such an opinion does exist was abundantly testified by the audience present at the reading of Captain Scott's paper; on which occasion it also appeared that the advances made in the direction of "end-on" firing were unknown, and consequently not appreciated. I therefore offered to read this paper on the subject, preferring that method of introducing to the notice of the Institution some inventions of my own, to importing them into a discussion on another man's views.

Lest it may be supposed by those unacquainted with my past advocacy of the combined "end-on and broadside system," that the opinions I now advance are based on recently-conceived notions, I hope to be pardoned for referring somewhat frequently to my former papers on the same subject, read both here and at the Institution of Naval Architects. These will establish the originality of my views, and prove that which I am very desirous should be understood from the outset, namely, that although I have been a constant and firm supporter of the broadside type of ship for sea-going purposes, I repudiate all partizanship, and never denied that the turret system might be applied in special cases with advantage; being actuated solely by that sentiment which I have invariably felt and expressed, viz., the desire of benefiting my profession and advancing the naval power of my country, to whose authorities my plans and suggestions have been almost exclusively addressed. (For extract from my paper of 1863, see below*). It is a source of great satisfaction to me to find that such opinions have been borne out in practice, and that objections which I have persistently raised to the so-called sea-going turret-ships have been confirmed even by the gallant inventor of that system, who has very materially altered his position.

The type he first advocated was said to possess an "all-round fire," the strong point much dwelt upon by him and all supporters of the system being the bow and stern attack; this, however, has disappeared, not only in his own ship, the "Captain," but in every other turret-vessel constructed to cross the ocean in which the "poop" and "forecastle" have been added as indispensable. End-on fire being thus impossible, most of the arguments adduced by him in condemnation of broadside batteries recoil upon himself, and the system, as applied to sea-going ships, may be fairly said to have retrograded since its first introduction.

* "For my own part I sincerely hope, both for the good of the country as well as for Captain Coles' sake, that his shields may prove an entire success, although I do not agree with him in condemning all broadside ships, and claiming for the cupola system all those advantages he believes it to possess, especially for sea-going ships. In any observations I may make I distinctly repudiate all idea of antagonism to his or any other particular system, my object being the benefit of the public service."—See Journal Royal United Service Institution, vol. vii., p. 315.



Diagram

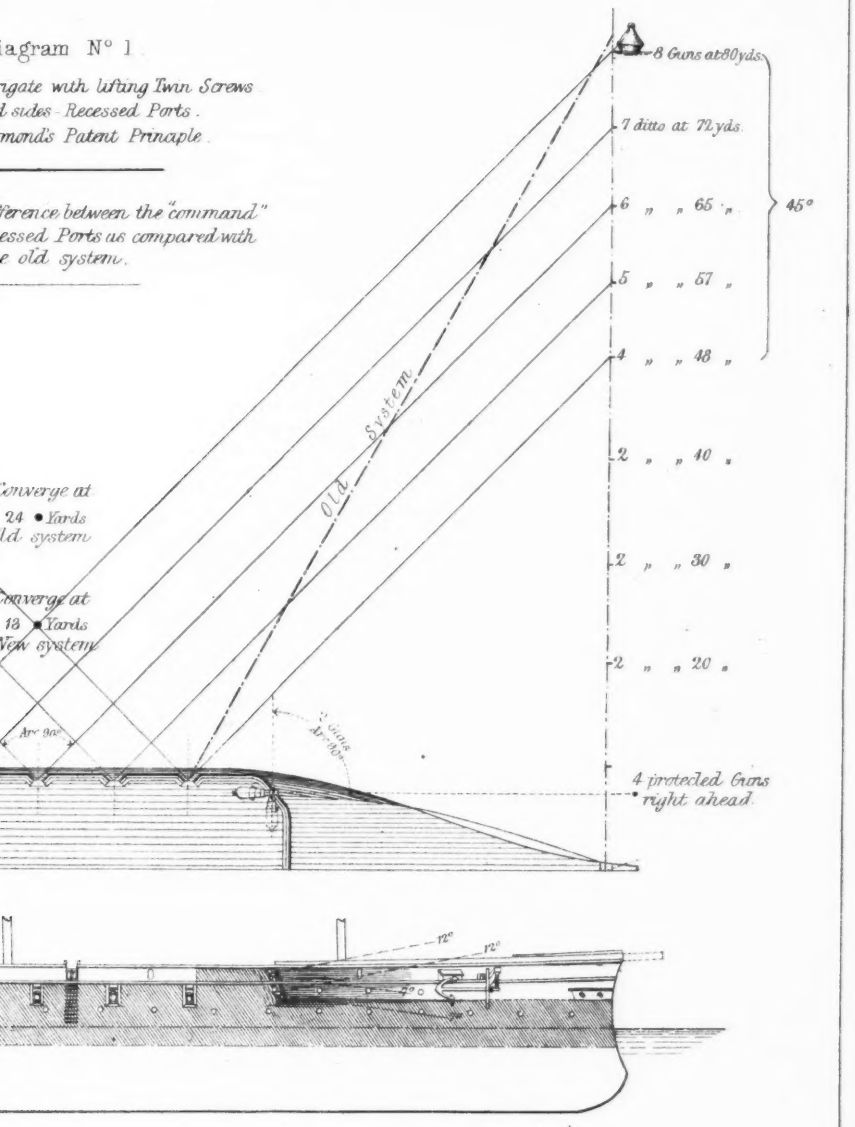
Armour plated Frigate with
Indented sides - Re
Capt^n T.E Symonds Pa

Illustrates the difference bet
attained by the recessed Por
the old sys

iagram N° 1

ngate with lifting Twin Screws
d sides - Recessed Ports.
mond's Patent Principle.

ference between the "command"
essed Ports as compared with
e old system.



Converge at
24 • Yards
Old system

Converge at
13 • Yards
New system

J. Jobbins

Elevation and Plan of Twin screw armed Transport "Bolivar"
with Captn T.E Symonds R.N Patent Indented sides.

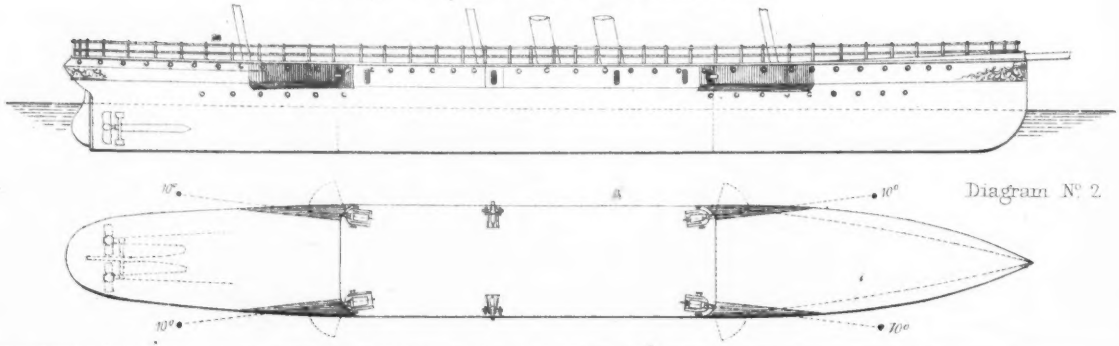


Diagram N° 2.

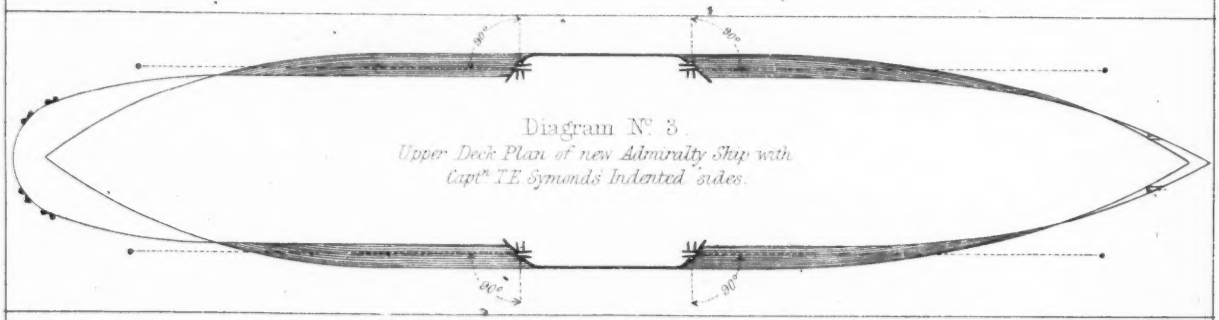


Diagram N° 3.
Upper Deck Plan of new Admiralty Ship with
Captn T.E Symonds Indented sides.

Section of Turret of the "Captain"

Diagram N° 4.

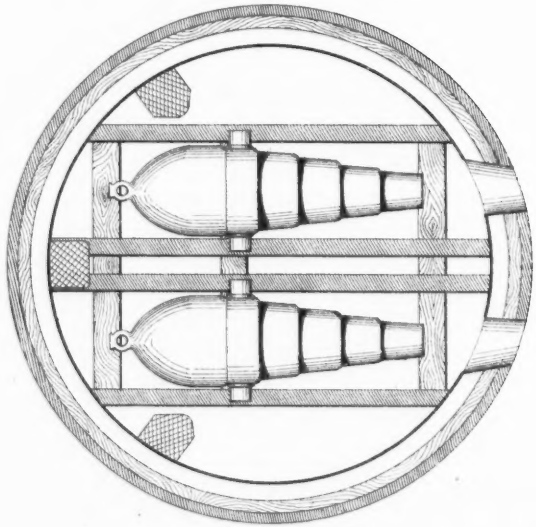


Diagram N° 4.

Diagram N° 5.

Coles' Turret
1 Gun at 6°

Symonds' end on & Broadside
4 Guns right ahead

Shewing the distinction between Symonds' & Coles' "end on" Fire.

J. Jobbins

Pl. XXXVIII

I believe that the apparent simplicity—I may say nakedness—of a turret ship, as first introduced to our notice, was that which captivated; no one could look at the early representations of Captain Coles' cupola ships without being struck by their warlike and wicked appearance; like a pugilist or a game cock, they appeared divested of everything that could interfere with their work, presenting the smallest possible object to an adversary, and no doubt well fitted for the duties they were originally intended to perform, namely, *harbour* defence, and *operating* on *inland seas* and *rivers*.

In seeking to extend his sphere of action to sea-going ships the simplicity has vanished; and in the struggle to make turret-vessels moderately seaworthy, Captain Coles is compelled to introduce to some extent the very features he has so constantly condemned in broadside ships, the proportions as regards a target being similar to those of ordinary ships. How far they will be sea-worthy is at present mere conjecture, but judging from those specimens that have been tried, I have very great doubts of their ultimate success.

Those who have served in brigs and vessels of similarly low freeboard, which from their lightness and consequent buoyancy could not fail to make better weather than ships heavily armoured, and who have seen what took place when a port was stove in, may readily conceive the effect that will be produced by the sea breaching between the turrets under the hurricane deck, which deck, by-the-bye, is after all a mere apology for a platform on which to work a frigate's sails, and to carry out those drills and exercises imperative for the proper organization of a ship's crew. Place the "Captain" in the same position as those broadside ships, the shortcomings of which Captain Coles was so severe upon, would not a wave run up the glacis of the low deck, and if not filling the turret, would it not certainly necessitate the use of waterproof cartridges as much as in the broadside ports?

Upon these points I shall refer to my paper on Steering and Manœuvring Ships, &c., read here May 18th, 1863. (Vide "Journal of the Royal United Service Institution," vol. vii., page 317.)

I am of opinion that Captain Coles claims too much for the sea-going qualities of his ships, which are as yet untried. They are low in the water as compared with ordinary ships—the actual side of the ship shown in his diagram being only 7ft. 8in. above the water-line, the whole defence from a sea being the flying bulwarks or flaps, the efficiency of which to resist a sea I doubt. A first-class frigate often ships a heavy sea over all—her side being some 13 feet higher than the top of his moveable gunwale. Such a sea would clear a turret-ship's decks. I think, therefore, until we have arrived at some method of construction which gives us qualities infinitely superior to those we at present possess, that we cannot rely on such a ship for laying-to safely in a heavy sea. Nor can we dispense with an upper deck, on which a sufficient proportion of boats and spars can be stowed with safety, and with stout bulwarks to protect them.

At the period when Captain Coles first introduced his system, the broadside ship was a very different affair to some of those since built, and more especially to many now building, in which "end-on" fire has been introduced to some extent.—Vide diagram, No. 3, Plate xxxviii.

The following table gives a list of the principal armour-clad ships in which bow guns have been fitted for right ahead fire:—

	Deck upon which the guns are placed.	No. of guns.	Height of Sill above load-line.
			ft. in.
Minotaur	Upper deck	2	19 6
Agincourt	ditto	2	19 6
Northumberland	ditto	2	19 11
Hector	ditto	2	17 6
Valiant	ditto	2	17 6
Royal Alfred	Main deck	2	10 9
Lord Clyde	Upper deck	2	19 0
	Main deck	2	11 6
Lord Warden	Upper deck	1	18 7
	Main deck	2	11 1
Bellerophon	Main deck	2	10 2
Pallas	ditto	1 ahead, and 2 at 14°	10 6
Monarch	Upper deck	1	16 7
Hercules	Main deck	1	13 9

The difficulty of working heavy guns on the broadside has been overcome: and Captain Palliser's invention has added so materially to the power of the present ordnance, as to render it a very great question whether we shall ever require a heavier gun than the present 300-pounder for sea-going purposes, in which case the value of the turret system becomes still more doubtful. In weighing the question between the broadside and turret armament, we should assume the calibre of the gun to be the same in both cases until it be proved, firstly, that a reliable 600-pounder can be made for service at sea; and secondly, that when made, a broadside ship cannot carry it. There is no more reason at present to doubt that this can be done than there was four years ago, when it was stated to be impossible to work 300-pounders on the broadside. Granting this view to be correct, in what consists the superiority of a turret ship's broadside, reduced 50 per cent. of its assumed weight? I can state with the utmost confidence that a broadside ship will carry not only as many guns on *each* broadside, of the same weight as those carried in the turrets, but she will carry *two additional*. It must also be remembered that when a turret ship is engaged on both sides, she can only fire half her battery at each adversary, whilst the broadside vessel brings her full number to bear on either side.

Without regard to the position of the guns, the "Bellerophon" and the "Captain" will exemplify this comparison.

I am very much disposed to lean to the opinion of practical men who have been under fire during the American war, that the rapid concentrated fire of many guns, whether against ships or forts, will be far more effective than slow discharges from concentrated armaments; and when viewing the various duties that ships of all classes have to perform, not excepting the occasional landing of their guns,

I think an additional argument will be found for many effective guns of smaller calibre rather than for a few very heavy ones.

It appears to me as though the broadside system has advanced in the same ratio that the turret has retrograded; each year has developed some new feature; the "square box" (a term often applied in derision of the "central battery," commenced in the "Warrior," and continued, I think wisely, in later ships) has had its corners knocked off by repeated broadsides from turret guns, and by indenting the sides a fixed semi-turret is formed at either end, from which four of the heaviest guns may be worked, end-on, through an arc of 90°, as shown in diagram No. 1 (Plate xxxvii), not shifted from port to port, as was the case when Captain Coles read his first paper. These guns are at such a distance from stem and stern as will enable them to be carried without prejudice to the sea-going qualities or speed of the ship, and fought end-on in the heaviest weather. The distance of these guns from each end of the ship under notice is about 90 feet, being nearly the same as that of the "Captain's" turrets, the weight of which, however, at those points is much greater than the bulkheads in my system. No valid reason can be assigned why even a 600-pounder should not be worked in ports so placed, when on a turn-table; they being retired several feet from the side, the weight is centralized, and the muzzle of the gun is virtually higher out of the water.

Particulars and Performance of "Bolivar."

The performance of the "Bolivar," an unprotected twin screw vessel, of 830 tons, 230 feet long, 27 feet beam, 10 feet draught, built and engined by Messrs. Dudgeon, converted and fitted out by me for the Venezuelan Government, as an armed transport, with "indented sides," is perhaps the best illustration extant, of the practicability of that system: proving not only that guns so placed can be worked effectively at a high speed, with a head or beam sea, in a vessel deeply laden, the muzzles of whose guns were only 7 feet 6 inches above the water-line, in an indent of 4 feet, but that such an arrangement of "end-on" armament can be fitted in the course of a few weeks to a comparatively small, sharp, narrow, high speed vessel, of ordinary construction, a trifling alteration in the superstructure only being required, to carry the heaviest guns *under a deck*, which is impossible in such a vessel by any other method. It will be seen by referring to the diagram, No. 2 (Plate xxxviii), that the "indents," which are 70 feet from the stem and stern, are so situated in the body of the vessel as to prevent overweighting the extremities, the flare of the bow practically throwing the wave clear of the indented ports, which were thus enabled to be kept open in almost all weathers.

Considering that this little vessel attained a sea-speed of 15 knots, was armed with 70-pounder rifled guns and 24-pounder howitzers (might have carried 100-pounders with the same ease), with guns to fire within 10° of the keel (they might be fired at 5° with equal facility), propelled by twin screws, by means of which her guns

were pointed with extreme accuracy; presenting an end-on target to an enemy of only 27 feet base (only 2 feet in excess of the diameter of the turret), and possessing a decked freeboard of 15 feet, under which there was the most perfect accommodation for a crew of 200 men, and capable of transporting 750 troops 3,000 miles on a 10 feet 6 inches draught of water; I think I may say that she is a very formidable vessel, and be permitted to ask how such results could be attained with a "turret" arrangement?*

I have peculiar satisfaction in referring to an extract from a letter received from the Captain of this ship confirming the above, as well as the statements I made in the years 1862 and 1863, in papers read at this Institution, on the advantages of the twin-screw system, for manœuvring ships with "broadside" and "end-on" batteries, a subject I have persistently advocated, which although condemned at first, is now being generally adopted, not only in "broadside" but in "turret" ships, thus proving that system is considered imperfect without them;—in fact since end-on fire has been established they are more necessary in the turret than the broadside.

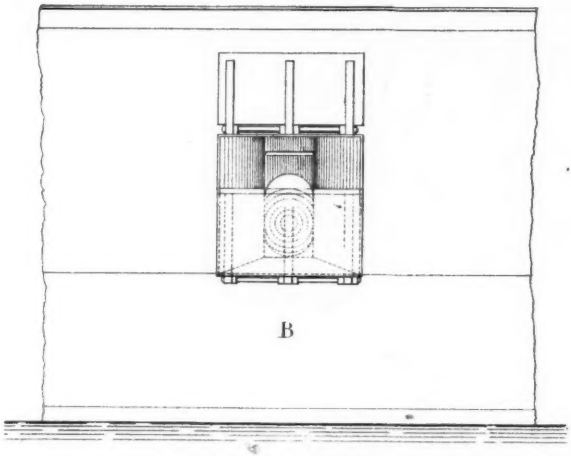
Captain of "Bolivar's" Letter.

"We had a splendid opportunity of proving the advantages of twin screws in "handling a ship in a crowded anchorage. When about to leave the inner "anchorage at Falmouth, we had a steamer close astern of us, a vessel ahead, and "one on each beam, and no room between the shore and these vessels to permit of "our going between it and them; at the same time there was a strong gale blowing "to which we were riding: when the anchor was tripped, the engines were started, "one ahead, the other astern, and the ship turned exactly in her own length without "drifting a foot to leeward during the operation. In performing the evolution it is "perfectly unnecessary to work the engines at more than 'very easy!' The ship "performed splendidly against the south-west gale which prevailed for two days "after our leaving Falmouth. There is no doubt that the twin screws are most "successful in forcing a ship against a heavy head sea and wind. We had another "proof of their superiority in the passage to Madeira—the port engine got a heated "bearing. I offered the engineer to stop it. He said that reducing the number of "revolutions would be sufficient; he, therefore, reduced the revolutions of that "engine down to twenty-five, and kept the other up to eighty. During the time of "the bearing cooling our speed was reduced hardly two knots, and hardly any effect "was noticed in the steering; this is a decided advantage. In picking up a snug "berth among shipping, or in mooring or unmooring with steam up, the twin screws "are invaluable, and lighten the labour immensely. We took a turn out of our "hawse when shifting berth to the quarantine anchorage, simply by turning the "ship right round with the screws. You know what work clearing hawse is, and "can, therefore, imagine how the usually tedious operation was simplified. The "indented sides are without doubt admirable, and in the heaviest weather have been "entirely free from any lodgment of water, and we were enabled to make excellent "practice with the guns."

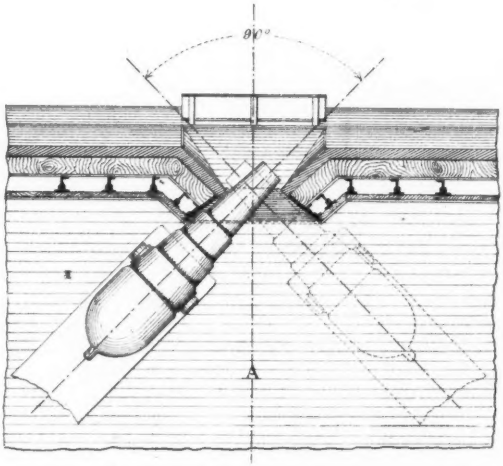
The "Pallas" is also fitted on this principle, but being a wooden frigate, and the plan having been adopted subsequent to her launch,

* The advantage of this method of armament in transports is very obvious even in this converted ship, especially when the decks are crowded with troops or cabins. The bow or stern guns in the indented ports having an arc of training of from 65° to 70°, thus obviating the necessity of transporting them from port to port.—T.E.S.

Diagram

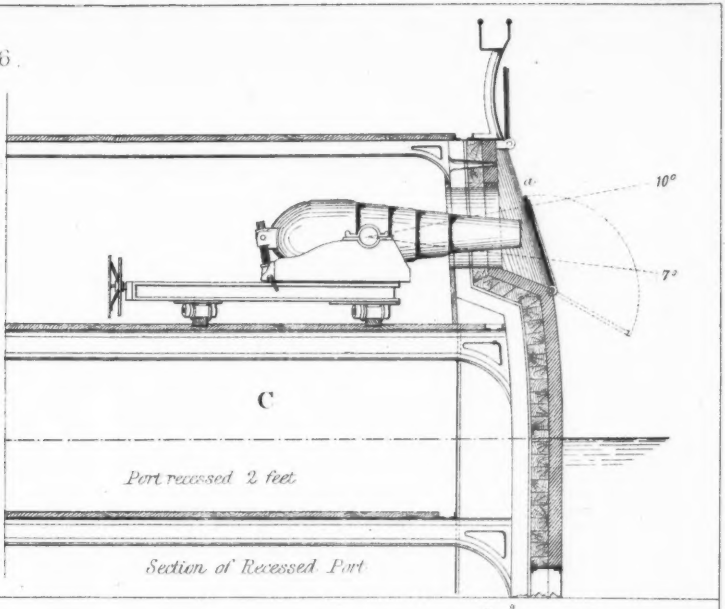


Elevation of recessed Port with Embrasure partially closed
Port recessed 2 feet



Plan of Recessed Port shewing arc of training 90°
Port recessed 2 feet

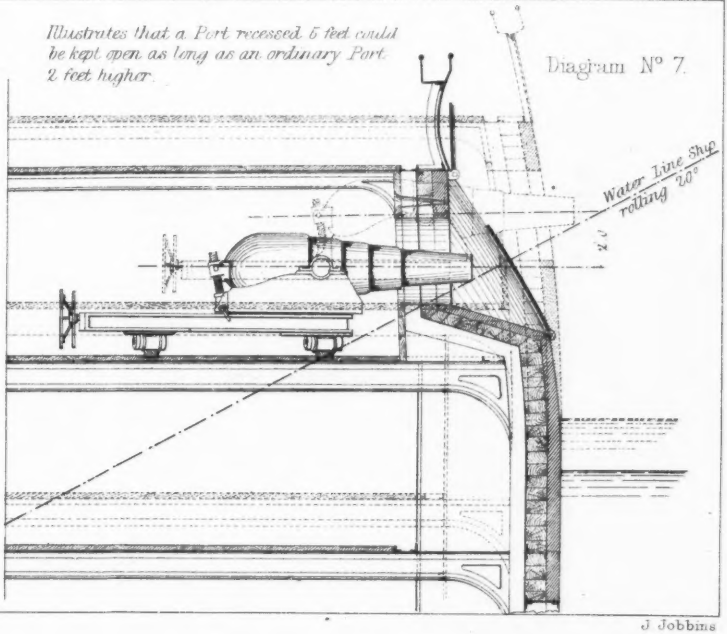
gram N° 6.



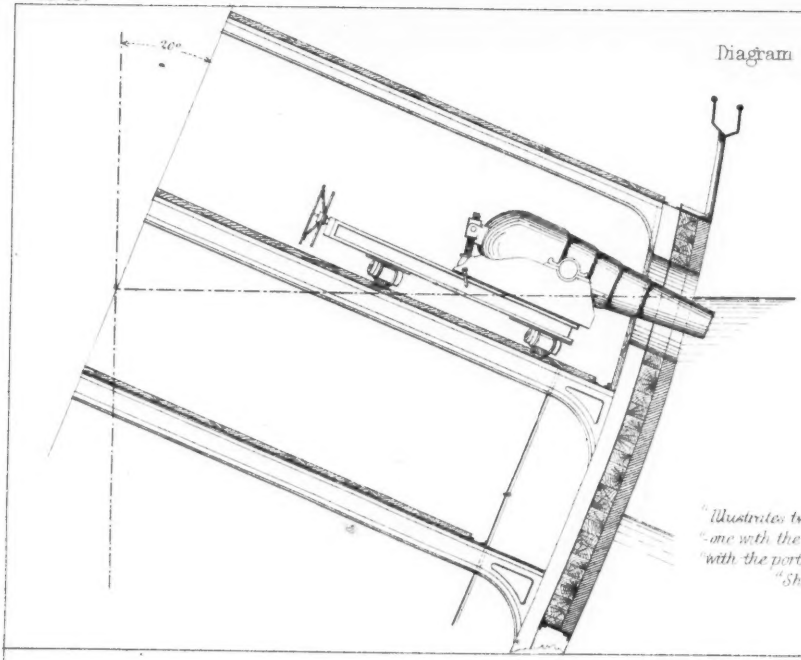
Section of Recessed Port

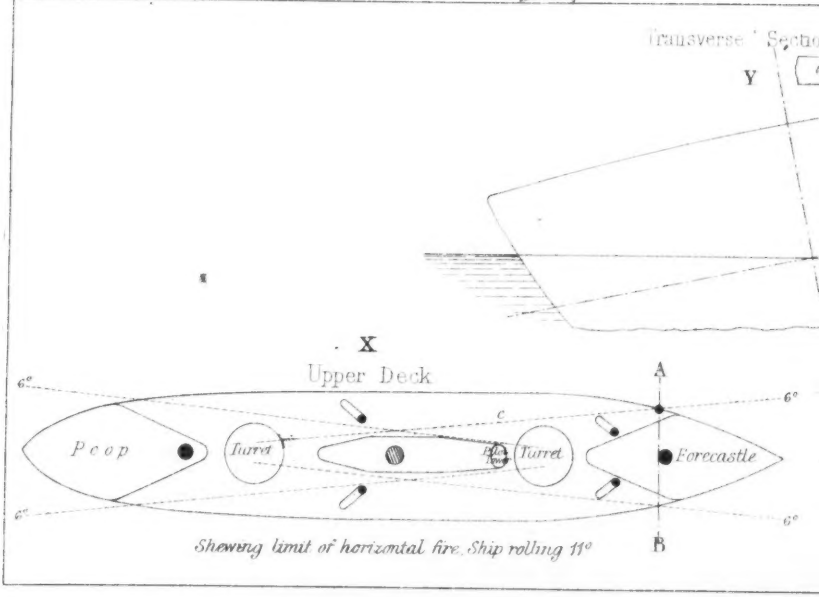
Illustrates that a Port recessed 5 feet could be kept open as long as an ordinary Port 2 feet higher.

Diagram N° 7.

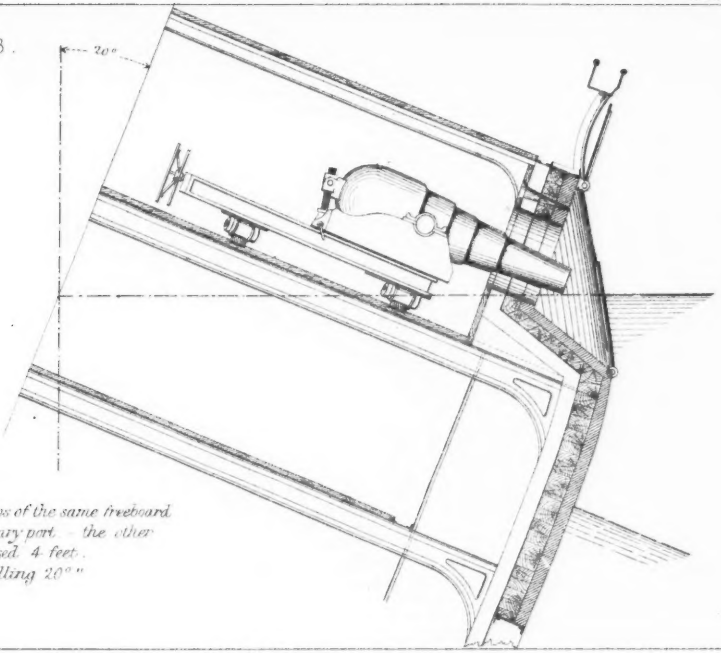


J Jobbins


20°
Diagram
Illustrates two
one with the
with the port
Shi

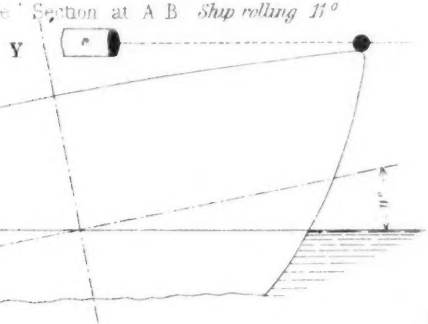

Transverse Sectio
Y
X
Upper Deck
A
B
6°
6°
6°
6°
C
Poop
Turret
Turret
Forecastle
Shewing limit of horizontal fire. Ship rolling 11°

iagram N° 8.



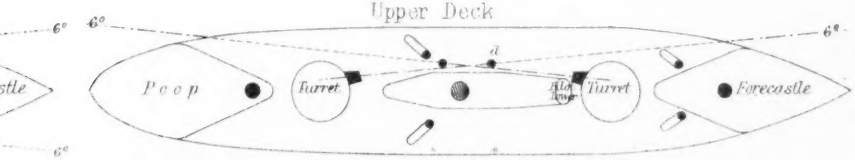
ustrates two Ships of the same freeboard
e with the ordinary part — the other
h the port recessed 4 feet.
"Ship rolling 20°"

e. Section at A B *Ship rolling 11°*



Z.

Upper Deck



Showing limit of horizontal fire Ship rolling 7°
head lifted 2°

J. Tobbins

the conversion has not been so perfect as in the "Bolivar," which is an iron vessel; the results attained in this ship, however, are also very satisfactory; I will now read an extract, from a letter recently received from an Officer of the "Pallas."

Extract of Letter from Officer of "Pallas."

"The more I see of the plan of firing from the bow and quarter battery ports, the "more I like it, and the more formidable does it make a ship appear in my eyes. "The other day we went out for gunnery practice, and fired at a mark against a high "cliff; and steaming quietly round in a circle, we fired from the broadside and bow "and quarter battery ports with great effect, and could have fired five guns ahead or "astern nearly in a line with the keel if we had liked—three of them quite, and the "battery guns only 14°, from the fore and aft line.

"It appears to me that the larger the ship, the more important it is to have the "indented sides; and in a ship like the 'Lord Clyde,' with guns on both decks, "really her strongest points of attack and defence would be 'end-on' if she had the "indented sides."

The "Research," originally fitted with the gate bulwark, has been also altered to this plan with very great advantage, both as a fighting and a sea-going ship, and it has added very materially to her accommodation and the comfort of her crew. Many of our new ships are being built on this system (vide Diagram No. 3, Plate xxxviii).

Distinction between Symonds' and Coles' End-on Fire.

Having thus described the method by which I attain end-on firing, I will now call your attention to the distinction between the power of firing "end-on" possessed by my system and that claimed for the turret. In mine, when constructed for the purpose, *not altered*, it is practically *right ahead* or *astern*—as in diagram No. 1; no need of yawing even half a point, four guns firing right ahead or astern *clear of every thing* at any angle of elevation or depression that the carriage will admit, whether rolling under steam or heeling under canvas; whereas the smallest angle at which the chase-gun of the "Captain" can be fired, in a horizontal line, is theoretically 6° (vide Plate xl, diagrams X, Y, Z); but we must bear in mind that *that gun is from the after-turret* (the fore-turret being blocked to 23° by the top-gallant fore-castle), the shot having to pass over 156 feet of deck, between the legs of the tripods which converge, topmast backstays, with such gear and obstructions on that deck, necessary to a sea-going ship, no matter of what description.

I think, it will be admitted, that this is rather close shaving, even under the most favourable circumstances in daylight, but what it will be on a dark night with the ship rolling and pitching (and even turret-ships will and do roll and pitch), perhaps short of coal, heeling over under canvas, or the deck and turrets enveloped by smoke or even fog, I do not think it will require a very imaginative person to predict. I have no hesitation in saying it will be impossible, and that if Captain Coles relies on this gun for firing "end-on," he will meet

with disappointment, as a consideration of the diagrams referred to, showing the line of a shot from the "Captain's" after-turret, will clearly point out. I am disposed to agree with Mr. Robert Napier, whose letter appears in Admiral Halsted's appeal to the Parliament of 1866, when he says,—"I do not fear the enemy's shot, so much as the "risk of a shot from the turrets themselves when engaged against "an enemy!"

In proof of the foregoing, I refer you to diagrams X, Y, and Z, (Plate xl); X being the plan of the upper deck of the "Captain;" Y being a transverse section indicated by the line A B in X. These diagrams illustrate the limit of horizontal fire from the *outer gun of the after-turret*, in the direction marked C, with the ship rolling 11°, this direction being at 6° from the fore and aft line, the angle claimed by Captain Coles. It will be observed that the slightest divergence would strike the bulkhead of the compartment shown amidships, or the foremost tripod leg; should the inner-gun be fired by mistake in the heat of action, the result would be fatal. Diagram Z, is also a plan of the turret-deck, showing that a shot fired horizontally from the outer guns in the fore and after turret, in a direction of 6° with the fore and aft line, would strike the deck, supposing the ship to have rolled through an angle of 7°, with her head or stern lifted by the sea to an angle of 2°; these points are marked *d* in the diagram. In this case a very moderate angle is assumed in both instances, yet it will be seen that it would be impossible to fire on the top of the rolling motion, even at that small angle. Apart from the foregoing I conceive the difficulties, pointed out with horizontal fire, will be increased when firing at great elevation, and I also think it worthy of remark that the tripod legs interfere materially with the line of fire from both turrets in many directions. I have always understood that the object of this invention was to avoid such interruption to the all-round fire so constantly insisted upon.

Now, I submit, that contrasting the difficulties that have been pourtrayed in this most approved example of a sea-going turret-ship, with the simplicity and practicability of my system, that until some more substantial advantage has been proved than appears on the face of it now, we should not only suspend our judgment, but hesitate before we embark too largely in sea-going turret-ships, no matter how confident its advocates may be, or how specious the arguments they employ.

Assuming that it *is* possible for the after-turret gun to fire effectively at 6° with the keel, as claimed; in doing so let us see the size of the target exposed, as compared with an opponent armed on my system. To effect this object the turret-ship must be yawed half a point, thus exposing the whole of her side; whereas if that opponent has guns firing right ahead, the extreme width of target exposed by her would be less than half her beam, the inclined face represented by the bow, say at an angle of 25°, would be a much more difficult object to pierce. Moreover, admitting the turret-ship to have 600-pounders, and her opponent four 300-pounders "end-on" guns, the preponderance of metal would be 600 pounds in favour of the "end-on" ship.

with this further difference, viz., that in any case the fire from the turret must be necessarily extremely slow and uncertain for the reasons stated, whereas from her opponent, there being *no obstructions or necessity for yawing*, the fire will be rapid and uninterrupted. Diagram No. 5, Plate xxxviii, illustrates the above.

Immunity of Turrets from danger.

Captain Coles' claim of immunity from damage for his turrets on account of their glancing properties cannot be substantiated, especially when engaging at a considerable angle with a broadside enemy; the turrets, when of such dimensions as the "Captain's," would *always* present a dead flat of nearly 10 feet wide by 7 or 8 in height; at a moderate range such a target would be struck by almost every shot, and always at right angles, for no matter in what direction the enemy may be, this dead flat will always be opposed to his guns; thus in the case I quote, the turret would be in a worse position than the flat side, which could only be struck at right angles when the enemy was exactly abeam. Now, referring to the diagram No. 4 (Plate xxxviii), which is a scale drawing of the "Captain's" turret, it will be seen that two ports are pierced within 5 feet of one another in the middle of the said dead flat or target, which conveys to my mind a structural weakness not to be found in the latest broadside ports (which are from 12 to 15 feet apart, and not of necessity so much larger than a turret's, as shown in Captain Coles' clever transparency on a late occasion), that weakness being increased by the bevelling of the ports in the turret, which is certainly equal to, if not exceeding, that required in the ordinary broadside ports. My port for a 300-pounder is 2 feet 4 inches by 3 feet 10 inches; the turret port being 2 feet 2 inches by 3 feet 7 inches.

Shell exploding in Battery and Turret.

Much stress was laid by Captain Coles on the disastrous effect that must necessarily be produced in the "Bellerophon's" battery by the explosion of a large shell, yet almost ignoring the possibility of such an event taking place in a turret in consequence of its small ports, contending that the result would amount to total annihilation of the battery, whereas the turret was to escape scot free. Now, it appears to me, that such an argument is untenable, for as before stated, the turret has two port holes within 5 feet of each other, representing a larger area, either being nearly as large as my port; and presenting two chances to one for a shell to enter. If a shell should perchance enter and explode in so confined a space, or if a gun should burst—neither event being improbable—what would become of the whole structure and its contents? There can be but one answer—utterly destroyed, and the ship, say the "Captain," deprived of *half her armament at one blow without possibility of repair*. I contend from our experience of the effect of shells in crowded batteries, that

neither the loss of life, nor destruction of material could be so certain and general as Captain Coles would have us believe, in a space 100 feet by 56 feet, having many hatchways and ports to facilitate the escape of the exploded gas, added to numerous obstructions on the deck, nor would the disaster be so irreparable as in the other case.

There is one point in the history of turrets, which has not hitherto been disposed of to my satisfaction, and which to my surprise was not decided during the experiments on the turrets of the Royal Sovereign: I refer to the effect produced on the training gear of the turret when revolving, by the impact of heavy missiles. I believe that the effect of a blow on such a structure in motion would be very different to that when stationary; the force of that blow being the weight and velocity of the projectile multiplied into the weight and velocity of the turret itself, which would represent such an accession of force as must doubtless have a much greater effect on the mechanism of the turret than when it is at rest: until such an experiment has been made I shall not be satisfied of immunity from danger on that point, bearing in mind, that the turret of the "Rolf Kraake," when in motion, was perceptibly influenced by the impact of shot from 9-pounder guns; and also that the official reports from America show, that the turrets of many of the Monitors were not unfrequently stopped by shot, and deprived of offensive power. All shot struck the "Royal Sovereign's" turret at a considerable angle.

Accommodation and Ventilation.

The last—but by no means the least important—points to be considered in a comparison between the "broadside" and "turret" systems, are accommodation and ventilation. In making this comparison we should carefully bear in mind, that the health, comfort, and general efficiency, of those who are doomed to be caged up for an indefinite period (in so limited a space as even the roomiest ship, at best is) depends on ample accommodation: the production of a mere fighting machine, still further curtailed of space, will not serve our purpose. A ship is not only our battery—but our home!—our parade-ground, our hospital—in fact, our little world for the time being, from which there is no escape, no matter whether from the elements, the foe, or, that greatest of all foes, sickness; every inch of accommodation is, therefore, of vital importance, every inch curtailed, from that now often too limited space, is pregnant with danger and discomfort.

If the superiority claimed for the "turret" system on these two points, can by any possibility be demonstrated to the satisfaction of independent and unprejudiced minds, I say, with great deference to those who so strongly advocate the "broadside" system, that the "turret" has made out a very strong case; but I do consider that Captain Coles, and those who so warmly support his system, are bound to give some more satisfactory proof on this point than bare assertion. It may be deplorable obtuseness on my part, but I confess I am quite at a loss to understand how depriving a frigate of a large

portion of two of her decks, as in the "Captain," and introducing "turrets" of 25 feet diameter on her lower or living deck, can produce an increase of accommodation; and looking at the wave-washed main-deck, and general arrangements, how the ventilation is improved—especially in hot weather—is equally puzzling. It must be remembered that the crew of a turret-ship are berthed on the lower deck, their only light being derived from scuttles cut in the armour-plates, whereas in the broadside they live in the spacious battery, well lighted and ventilated, having a clear lower deck to fall back upon if requisite.

Monitors.

Before quitting this portion of the subject, a few words on "sea-going Monitors" may not be out of place, especially as attempts have been made here, and elsewhere, to urge the adoption of these most unseaworthy fighting machines. That such vessels were most formidable, and very useful on the broad deep rivers of America, and that they did good service occasionally on the coast, cannot be questioned, neither is it untrue that there are some instances on record in which they behaved, for such vessels, well in bad weather; yet, as a rule, they made very bad weather, some were lost, and others nearly so.

It is also true that one came to Europe carefully convoyed by other vessels, and that another under similar circumstances went round Cape Horn. These two facts proved nothing more, in my estimation, and served no more useful purpose than did the voyage of Hudson in the wee ship "Red, White and Blue," or the winter race of the three American schooner yachts, all of which were undertaken in the same spirit of enterprize, and for the gratification of the same pardonable feeling of national vanity, further influenced perhaps in the case of the "Monitors" by political expediency. At all events, the experience and opinion of the warmest supporters of the turret system in this country is against them, they having been compelled to abandon the low deck and all-round fire, which is their strongest point, to try and make them seaworthy by adding a poop and forecastle, and deck accommodation. To contend that two such voyages proved the sea-going qualities of the class, and to urge the adoption of such vessels, for the *protection forsooth*, of the magnificent fleet of ironclad ships we now possess, is simply one mode of proclaiming utter ignorance of a subject which none but a practical seaman can properly grapple with.

I have taken some pains to elicit information respecting the performances of these vessels, but accounts and interests are so varied and conflicting, and opinions run so high, that it is impossible to form any save an adverse conclusion. One point, however, I believe, cannot be denied, and that is their great unpopularity in the American Navy, owing to their unhealthiness and general discomfort.

That some such improved type of vessel, but of a much smaller description, may be found eligible for our river and harbour defences, I will not for a moment question, but I have too much confidence in the abilities of our own naval architects and shipbuilders, to suppose for an

instant that we shall require the assistance of Captain Ericson, or any other equally talented foreigner, to design them.

It appears remarkable that if the Americans are so highly impressed with the value of the turret system for sea-going vessels, they should not have applied it to the powerful corvettes they are now building, which are essentially the old type of broadside vessels; and I know on reliable authority that they are on the point of constructing ironclad ships on the combined broadside and end-on principle.

Steadiness of Platform.

Steadiness of platform after all is the grand desideratum; for guns and manœuvring power are comparatively useless, no matter whether in turrets or broadsides, unless a moderately steady platform can be obtained. Captain Coles of course considers that this is to be insured by the adoption of the "turret system," especially when accompanied with low freeboard; and he tells us that the difference between the rolling of his "turret-ship" and that of a "broadside" of the same class, would be as 7° to 20°—a difference which I very much question.

I believe it will be found that, even if a "turret ship" did roll to a less angle, she would roll much quicker, and therefore render firing even more difficult than with the slow roll of a "broadside ship." However, if there is a proper disposition of weights, and a fair proportion of length, breadth, and depth given, *which is quite as possible in one system as the other*, I see no reason why a turret-ship—the "Captain," for instance—should roll less or be easier than a broadside ship; this, however, will very shortly be proved. In the meanwhile I may observe that no one can for a moment dispute that the "Monitor" is the form least likely to roll of any description of vessel extant, being in point of fact the nearest approach to a raft, which has *no* oscillating motion. There is, however, a vast difference between the form of a "Monitor" and that of the "Captain," which is similar to an ordinary ship, and thus subject to the same dynamical laws; whereas the "Monitor" preserves the raft-like form aloft, in projections from either side, which constitute the main cause of her steadiness.

Although the form of the midship section has doubtless great influence on the steadiness of a ship, the longitudinal distribution of weight on a long flat floor is, I consider, even a more important element towards producing it. It is well known that ships and vessels of every class having the longest floor are invariably the easiest and steadiest. In the "combined end-on and broadside" system, all the weights are concentrated in the weight-carrying portion or "body" of the ship. The extremities being thus kept light, may be finer, which tends to an increase of speed, reduces pitching, improves steering properties, and contributes to the general steadiness of the platform. Now in the "Captain" this is reversed, the "turrets" being placed at each end, 152 feet apart; an unequal and wide-spread distribution of weight that will, I consider, have an injurious effect upon her performance as a sea-boat, and consequently as a gun-platform.

In Captain Coles' criticism on the rolling of broadside ships, he appears to ignore upper-deck guns, which are already applied to some extent in existing ironclads, and are on the increase (*vide* Diagram No. 3, Plate xxxviii). These guns will give a great advantage over the turret in bad weather, or in fighting at close quarters, as they will bear upon the tops of the turrets and decks, they being 19, and in some of the latest models 20 feet above the load line. As stated in previous papers, I advocate having a lighter description of unprotected guns on the upper deck, believing that at close quarters they would much influence the fate of an action. A light spar deck to cover them and work the sails on, would be useful.

In the firm persuasion that the broadside type of ship was the best for sea-going purposes, but fully recognizing many weak points in the earlier examples, I have persistently endeavoured to make such alterations in the superstructure which, though calculated to reduce weights at the extremities, and give a better angle of training for the guns, would not interfere with the continuous side, on which there can be no question that a "sea-going ship," *in the genuine acceptation of the term*, must rely for support in a seaway. The first difficulty was the very uncertain power of manœuvring long ships with a single screw. The twin screw system, worked with separate and independent engines, not only relieved me of that difficulty, but gave me the power of absolutely pointing fixed guns with the greatest precision, the ship, as I stated in my paper of 1862, "*becoming the turn-table for her guns.*" However, the same disadvantages that I have dwelt upon in the turret-ship with a forecastle and poop, occurred to me in this twin screw-ship, which led me to the invention of the "indented side," a plan to which I have referred on several occasions in the course of this paper, the value and originality of which was so courteously acknowledged by the Controller of the Navy, in his able speech during the discussion on Captain Coles' last paper at this Institution.

The next weak point which presented itself to me was, I frankly confess, that on which Captain Coles justly dilates, although perhaps rather caricaturing the picture; I refer to the small arc of training attained in the broadside port (even when every sacrifice is made to increase it), and the difficulties attending loading broadside guns when rolling in a seaway. It is with a view of remedying these certainly weak points in the broadside system, that I have invented the construction of a port, represented in the diagrams before you; in the discussion of which point I trust to receive that assistance which can alone be found in the criticism of able practical men, and such as has invariably assisted me at this Institution. Diagram No. 6 (Plate xxxix), represents three views of a broadside port retired, or recessed, two feet from the side, A the plan, shows that an arc of 90° training is obtained by this method, with a 300-pounder gun in a port 2 *feet* 4 *inches wide, which is* 5 *inches less than the ordinary port*, in which an arc of only 60° is obtained by bevelling to such an extent as to weaken the structure in the wake of the port; the gain in my method is therefore 30° additional training, decreased width of port, and greater structural strength; 18 inches recess would give a similar result in training. B

is the elevation shewing the method of closing the embrasure, so as to present a smooth side to the water when not fighting; the upper half is shown open in the diagram. C is a section of the same with gun run out, port 3 feet 10 inches high, elevation 10°, depression 7°. The carriage shown in the diagram is intended for that of Captain Scott's, but were a slide fitted with a pivot-bolt it would be under the incline of the recess, and almost immediately under the muzzle; it would be thus well protected, and in a better position for training; the triangular space "*a*" shown, represents one face of the embrasure, the side of the ship being tumbled home. I curve the top-side outwards, which is calculated to throw off a very considerable mass of water, that might otherwise break in-board in ships that do not rise to a wave. The advantage of fitting ports on this system will, I think, be evident on referring to Diagram No. 1, in which the lines shown represent the command by the new system, the dotted line the command of the foremost gun in the old. Thus in a ship with 18 protected guns, it will be seen that at 80 yards there are eight guns on the new system that would bear, but none on the old, and so on; with four protected guns to fire on a line ahead or astern through an arc of 90°, and one unprotected chase gun at either end. The broadside concentrating at 13 yards by the new system, and 24 yards by the old, I thus show an uninterrupted all-round fire, free of all those contingencies consequent on firing over the "Captain's" deck; no point is undefended, the normal construction of the ship remains unchanged, save in the upper works; and those changes do not involve any great alteration of form or difficulty of construction.

In this early stage of the invention I may have overlooked other objections or advantages: leaving you to kindly furnish the former, I will briefly allude to several of the latter. It is equivalent to an increase of freeboard of rather less than one-half the distance recessed. Thus, with the port recessed 5 feet, as in Diagram No. 7, Plate xxxix, it could be kept open as long, or longer, than an ordinary port in a ship with two feet more freeboard, as represented by the dotted lines, both ships being shown at the same inclination. Diagram No. 8, Plate xl, illustrates two ships of the *same freeboard*, one with the ordinary port, the other with the port recessed 4 feet, ship rolling 20°, showing that the recessed port can be kept open and the guns fought, when it would be impossible to open the ordinary port. *With the lower part of the recess closed, as shown in this diagram, it might be kept open still longer.* With the embrasure thus partially closed, the gun may be sponged, loaded, run out, and *pointed*, the object being kept in view through the sighting aperture over the port, the gun's crew being protected from riflemen, grape shot, &c. In extreme training there will be more room for working the gun, and the men will be less exposed. The muzzles of the guns do not project beyond the side, and are, therefore, protected from raking fire. A ship so fitted could effectually mask her battery. Lastly, this is a means of relieving the side of the ship from undue weight; is favourable to tumbling home the topsides even to a greater extent than shown in the diagrams; and for all practical purposes the armament is sufficiently centralized. Unless

some insuperable objection turns up that neither I, nor those I have consulted, have hitherto discovered, it appears to me that this system will add materially to the efficiency of the broadside-ship, and disposes of many objections raised by Captain Coles, as regards exposure of the gun's crew when loading, either to "green seas" coming in through the ports, or to the "fire of small arms picking off the men;" bearing in mind that a port on this system is very little, if at all larger than the turret ports, which are *two to one*, and that muzzle pivotting can be as readily applied in one case as the other.

In conclusion, I venture to hope that notwithstanding the shortcomings of this paper, which, considering the importance of the subject under notice, claimed more time and care than severe indisposition enabled me to bestow upon it, it may, at least, have the effect of leading discussion into some channels that have not hitherto been opened up; I hope also that I have succeeded in demonstrating that the broadside type of ship, is that best calculated for maintaining our prestige on the ocean, and is *not so deplorably deficient of every attribute that a fighting-ship should possess, as to necessitate appeals to Parliament—or any other sensational manœuvre, or agitation, for a reconstruction of our sea-going Navy on the turret principle.* I believe such a measure to be fraught with great peril, and I am convinced that a wise discretion has been shown in resisting the pressure in that direction, till some more satisfactory evidence has been received of the actual performance of a turret-ship, beyond the accounts of smaller vessels on that principle, which, as a rule are anything but satisfactory.

Mr. Bell Galloway: My Lord and Gentlemen,—As this subject, the subject of ships of war, has occupied my special attention for twelve years, probably I may for a few minutes interest you. I have lived long enough to learn this one lesson, that it is not always wise to ignore the wisdom and experience of our ancestors. I am not one of those who advocate a reconstruction of Her Majesty's Royal Navy, and I believe that we are approaching the time when it will be found to our cost that the wooden ships that have been so much condemned, after all, possess properties and qualities which iron ships to a very great extent will be found deficient in. In reference to the paper which has now been read, I agree very much with what Captain Symonds has said in respect to that part which he quoted of his paper which he read in 1863,—altogether in that part in which he advocates the necessity and value of light armour on the upper and other parts of the vessel. But I have just this one suggestion to offer. I have a plan—we all think our own plans the best—I should feel honoured and extremely glad, and I ask the privilege as an Englishman, upon national grounds, for this Society to give me the opportunity to produce my combined plan of the broadside and turret principles. I will put that plan side by side with Captain Symonds' and Captain Coles', and leave you, Gentlemen, to form your own opinion.

[The Chair was here taken by Rear-Admiral Sir F. W. E. Nicolson, Bart., C.B.]

Commander Colomb, R.N.: Captain Symonds opens up to us questions of the greatest possible extent, and it is most difficult to say how far their bearings upon the question before us apply. He mentioned the reasons which led him to place the guns at the extremities of the ship, to get the fore and aft fire, but he did not mention, what I think is the most important reason of all for the end-on fire, and that is, the use of the weapon which proved so destructive at Lissa. Now I am not going to get upon my hobby, members need not therefore be afraid. I am not going to wander from the discussion, but I think, whatever we else saw at Lissa, we

saw enough to assure us, that ships can no longer, with security, keep themselves in the best position for fighting guns placed on the broadside, without reference to end-on fire. I look upon it that we are getting more and more into the position that we were in, when guns were first introduced, viz., that ships will get more into the way of fighting their battles nearly end-on; because if one ship is intending to attack with her ram, the ship which intends to defend with her guns cannot do so to the best advantage to herself, unless she is able at the same time to take a position something like end-on to the ship which is going to attack her with her stem. Therefore, I think on that ground, without reference to any other question, I should support the plan which gives us the best end-on fire, because I think that a fire which can only be used on the broadside, is becoming every day more and more useless. I could almost have wished that this discussion had been adjourned to the marine shed of the Exhibition of Paris, where there was every description of possible, and, I might almost add, impossible, ship before us, and where we should have seen attempts to give this end-on fire in the best possible manner, and the broadside fire as well. Now, as regards a competition between the two principles which have been so prominently brought before us to-night, the turret principle and the broadside principle, I own that I have always had, and that I still have, the greatest possible difficulty in coming to any conclusion upon the subject, and my endeavour has always been, and I am afraid even after what we have heard to-night, my endeavour must still be, to keep my mind open. We were told, first of all, that the turret system enabled a ship to be completely armoured, that there was no part of her, not completely armoured, exposed, and that it was not possible fully to armour a broadside ship. Then, after a little while, that point disappeared, and it was proposed to build partially armoured turret-ships. Then it was said that the turret was a necessity for using the heaviest classes of guns; that these heaviest classes of guns which had become a necessity from the increased defensive powers of ships, could not be worked except upon the turret principle. Well, that appears to have been put to experiment, and, so far as I can gather, those who are most acquainted with the subject say that this has disappeared as a fact altogether, that there is no difficulty in working the heaviest guns upon the broadside. At the same time I cannot help recollecting, that when there seemed a chance of our going to war with Prussia and Austria in reference to Denmark, I looked upon that "Royal Sovereign" (I had heard remarks all round me that that was the ship to send), and that she was the most effective ship in the Navy, and my instinct told me she was the most effective ship in the Navy, but why, I am unable to say. Many remarks have been made to-night about the height of freeboard, and I have been surprised to hear people from time to time saying that such a vessel has so much more freeboard than another ship, and is able to fight her guns so much longer. Now, the working of guns depends upon other considerations than the height of freeboard. A small ship with small freeboard will be able to fight a gun on that deck (pointing) when a large ship with very much greater freeboard will not be able to do so. As regards the point brought forward, that of advocating many light guns—

Captain SYMONDS: Not light; I did not say "light." Smaller—taking the 300-pounder, for example, instead of the 600-pounder.

Commander COLOMB: There can be no question, I think, that if you can get guns to penetrate, the smaller those guns are, and the more of them you have, the better. Again, we have the twin screws. I am sorry to enter into so many particulars, but this point arose. Captain Symonds is a very strong advocate for the twin-screw system; perhaps I am also, to a certain extent. I fully agree with his remarks about the great facilities given by the twin-screw for turning, where questions of space alone are concerned. He gave us an extract from a letter showing how admirable the twin-screw was in going to an anchorage amongst fixed points. Now, the twin-screw has great manœuvring advantages, when you are dealing with space alone, but it has no advantages where you are dealing with questions of time, and it does not give you advantages as a rule in fleet movements. I am very much surprised at the plan which has been submitted to us, of the upper deck of the "Captain." I hoped to have seen in the Exhibition at Paris a model of the "Captain;" her name and the place for the model is there, but the model itself is not there. I must say that

I am very much surprised that the best turret-ship, the turret-ship the plans for which, were left in the hands of the inventor entirely, should be in the position of having no "end-on" fire, either at the head or stern within six degrees each side of the line of the keel. It seems to me—what shall I say? a most tremendous oversight. If it is a necessity of the turret system; it is so much to the discredit of that system. As to the explosion of shells in turrets and in "the box," to give it the name by which it is generally called, I think Captain Symonds forgot to point out to us that the chances of the shell bursting in "the box" were very much greater than the chance of a shell bursting in the turret, because "the box" is a very much larger object. The destructive powers of the shell would perhaps be equal, but I think as a matter of fact, the chances of a shell bursting in a turret are very much less than the chances of a shell bursting in the larger object—"the box."

Captain SYMONDS: The point in Captain Coles' paper was the entry of the shell through the port, because the port was so large. He contended that the ports were so large that the shells must necessarily go into the large "box."

Captain COLOMB: I was very unfortunate in being obliged to be away when Captain Coles read his paper, but I do not think that matters, you have so many more ports. I will only make one other remark about the disposition of the weight. Admiral Paris shewed me some experiments of his with reference to the question of the disposition of weights as affecting the rolling properties of ships. He had made an instrument for registering very accurately the extent to which ships roll. I was very much struck with one of his experiments. In one case he made the experiment with a boat. He placed the weights in the centre, on the line of the keel in the first instance, and afterwards at the side, as the armour-plates would be. The rolling was very much less in degree when the weights were placed at the extremities than when they were placed in the centre.

Captain SYMONDS: The extremities of the ship?

Captain COLOMB: No, the extremities of the beam. The weights were the same height from the water.

Captain F. B. CRAUFURD, R.N.: Captain Symonds referred in his paper to the American "Monitors." Now I happen to have seen the one that went round Cape Horn. I went over her, and heard of her performance at sea, and she certainly appeared to me to be an instance of seaworthiness which told very much in favour of the style of ship she is. She was accompanied by the "Vanderbilt" and the "Tuscarora," and was with them when they were caught in a very heavy gale. The "Monitor" fell into the trough of the sea, and the "Tuscarora," which lay to at the same time, thinking that something would happen, that the "Monitor" would be submerged, bore up to her assistance. The sea was so heavy that it broke on board the "Tuscarora," and forced its way down her hatchways, putting the fires out. She was nearly swamped, but, strange to say, the storm had not the slightest effect upon the "Monitor." She was flat-bottomed, and had one very small mast. She could fire in every direction all over the deck. As I said, I went over her, and her accommodation below was very good. Her ventilation was said to be perfect. Her speed was said to be nine knots. She carried 14 days' coals, and has gone from the United States through the Straits of Magellan to San Francisco. Like Captain Colomb, I think it is very difficult to decide upon the merits either of the turret or the broadside principle. One thing I am very glad of, and that is that a ship on the former principle is being built, and that the inventor will have a fair opportunity of testing his principle thoroughly, and we shall then on our parts be able to come to some decision.

Captain SYMONDS: Had that "Monitor" two screws?

Captain CRAUFURD: She had two screws.

Captain SELWYN, R.N.: I must first pay what I think every member will think very well deserved, a tribute of admiration for the way in which the paper has been prepared under the difficulties Captain Symonds has gone through, and for the very able way in which he has put his subject before us. Secondly, I should like to draw attention to the fact that in all these matters, not less in guns than in ships, we are engaged in a series of compromises; that whereas the works of the Creator come from His hand perfect for every purpose for which they are designed—for instance,

the wild swan is as perfect in the air as in the water—man must necessarily always engage in compromises, and he acts very unwisely when he seeks to exclude compromise. When he tries to get long range, as well as great penetrative power in shot, or sea-going qualities in connection with invulnerability in ships, he must necessarily exclude some other most important points. Complete invulnerability, which was the point at which Captain Coles aimed in his turrets, was obliged to be supplemented, because the ship that carried the turret would go down if she too were not armoured; while you will recollect every bit of armour on these broadside ships is as well devoted to the defence of the gun as to the defence of the ship. It fulfils therefore two objects, instead of fulfilling, as in the turret-ships, only one. Now with regard to the "tumble home," it is, in those parts of Captain Symonds' ships devoted to ports, a tumble home to all intents and purposes. Mr. Galloway, who has spoken, admiring the wisdom of our ancestors, carries me very much with him. I remember in all large ships what some call the rule of thumb—I should say the science of our ancestors—taught them to bring their weights inboard and make the upper decks tumble home. They obtained many of the advantages in their large ships which Captain Symonds has obtained here. A point which has not been adverted to to-night, but which is a most important one, is that of the power to engage on both sides. Recollect that the comparison of the weight of metal of the cupola ships with that of the broadside ships, has always been made as if it was supposed we should never again engage on both sides. That is a very unfair comparison. When we see sixteen guns in the broadside ship, and four, or possibly six, in the turret-ship, we must remember that not even the difference of 600-pounder guns as against 300-pounders, which I do not admit to be a necessity in any way, for I have always said broadside ships can carry any weight of guns you choose to put in them —it is entirely an affair for the naval constructors—if even that were the case, and our broadside ship cannot carry the same weight of guns, yet the difference of the number of guns and the power of firing on both sides, leaving out the question of "end on," would be much too important for any maritime nation to overlook. It has been remarked by Captain Craufurd that he had heard the testimony of her officers as to the behaviour of one of the "Monitors" at sea. But I want to know, supposing we have a fleet in which we have got a certain number of "Monitors," which can go nine knots, and a certain number of broadside frigates, which can go fourteen, are the broadside frigates to keep down their speed of fourteen knots in order to keep with the "Monitors" of nine knots? Are they, when there is a fair wind, to wait when they could go 12, 13, perhaps 14 knots, under sail; are they to wait because the "Monitors" cannot steam more than nine? what would be the result of such a mixed and heterogeneous fleet? But of course that is on the assumption that "Monitors" can be made sea-going; for though "Monitors" have made passages, I utterly and totally deny that anything that does not hoist an amount of canvas proportionate to her size can ever be considered as a proper sea-going ship. I regret very much—I do not know whether it is from the necessities of the case or the ignoring of the naval officers' wishes—that we are now deprived of masts in ships of war, and have only jury-masts in their stead, so that we are under the lamentable necessity of getting up steam if we have to wear or tack. We cannot move, in fact, without reference to our engineers, and our engineers tell us that to drive this enormous ship at any speed such as you think proper for her, you must have such a horse power concealed under the nominal horse power as would infer a consumption of fuel which leaves you for your finest ships only four days' coal to go to sea. Here is the "Bellerophon" at this moment only carrying four days' coal. [A MEMBER: Full power?] I assume that you want to chase, or do anything that may be required. The fact is, you have descended from ten days' coal to four. That is not wise; it is not worthy of our age, and something must be done to economise fuel in some way, in order to restore us to our ancient power of going for longer voyages than four days under full steam. But why should we ignore the wind? Mr. Cunningham has very cleverly carried us on in machinery for our sails, so as to give us even with reduced crews a power of managing sails which are in full proportion to the ship. That ship, if full rigged (pointing to one of the diagrams), we have every reason to believe, will give us a proportionate speed

as far in excess of what has been attained by former ships, as the liners of to-day to Australia are in excess of the old vessels, which used to be content to go seven knots on a bowline, and twelve when they got before the wind. I must say also, though in Captain Symonds' presence, that to his illustrious uncle we owe, in his day, the very greatest improvements in the Navy, and that he is following worthily in his uncle's steps. There is another point I should wish to draw your attention to, namely, that the latest improvement in finding out the causes of the rolling of ships, described by Captain Colomb as the work of Admiral Paris, might be seen in Somerset House in a tank as the result of the studies of Sir William Symonds. He devised models; he carefully calculated the effects of the disposition of weights, and shewed how the times and depths of rolling might be increased or decreased at pleasure; and he taught us the mathematical laws by which the rolling of a ship may be brought under proper control. All these things make me extremely reluctant to fly at once to a system—the turret system—which I have always said, and shall continue to say, is most admirable for the purpose for which it was designed—for coast defence and for shallow water attack—but which is utterly unfit for many of those objects which the fleet of England ought to be able to fulfil at sea.

Mr. Bell Galloway: Might I be allowed to add this one remark? Following up the remark that the "Bellerophon" can only carry four days' coal, I offer to save 15 to 25 per cent. in every ship in Her Majesty's service, and I will prove that I can do so if I may take a ship to prove my experiments by.

Captain Fremantle, R.N.: I wish to ask a question with reference to that diagram of Captain Symonds, before us. There is a gun to fire right ahead, by the end-on system, and he tells us, I believe in the "Bolivar," the vessel which he quoted, and another ship, that their guns fired only nearly, not quite, in a line with the keel. I believe I am right in saying, that no vessel has been built with a gun to fire right ahead. If I am wrong, Captain Symonds will tell me so, but this gun seems to me to be firing right ahead.

Captain Symonds: Which is the gun you refer to?

Captain Fremantle: I am alluding to this gun (pointing), supposed to fire right ahead or astern. The great argument against the turret-ship being that she would only fire within six degrees of the line of the keel (I think it is important), it would seem to me that when the ship is heeling considerably, say 15 degrees, it would be rather a dangerous thing to attempt to fire that gun, or to attempt to fire a gun in that direction.

Admiral Robinson: I think the Officer who has just spoken has misunderstood Captain Symonds altogether. The gun on the upper deck does not interfere with the gun on the main deck, or below it in any way whatever. If I am not mistaken, Captain Symonds, that is your position? The gun that fires fore and aft is on another deck; it is not on the same deck.

Captain Fremantle: I understood Captain Symonds to say that the gun I have alluded to is supposed to be on the main deck. I would also ask Captain Symonds whether, when the ship is heeling 15 degrees, he is of opinion that it would be safe to train the gun in the line of the keel? whether it ever has been tried?

Captain Symonds: To answer the questions that have been put to me; and firstly, with reference to Captain Colomb's remarks as to freeboard, I am not aware that I took any position with regard to freeboard. I merely touched upon freeboard in mentioning that Captain Coles expected to get a more steady platform by simply reducing the freeboard. That I do not agree with at all, because there are other conditions to be considered as well as the reduction of freeboard. As to twin screw ships, it is not my purpose to lecture on twin screws now, but simply to reply to Captain Colomb by saying this—that I do not know any position, whether in narrow or in broad water, where a twin-screw ship cannot turn quicker than any other. At all events, if there is any other, I have never heard of her. It is quite against my experience. I see a gentleman here who has built some twelve or fourteen twin-screw ships, and who perhaps can tell me if he has ever heard of any that can turn quicker. As applied to ships of war, I look upon the value of twin screws for the purpose of turning your ship *half round*. You never want, as Admiral Halsted jocularly expressed it, "to spin a cockchafer" with a ship,

turning her round and round, but you simply want to turn her *half round*, or you want to do that which you can do with the greatest facility—move her through an arc of 20°, 30°, or 40° backwards and forwards with the same precision as you can a turn-table.

Captain COLOMB: My remark was, that with regard to the question of *time*, when you wanted to turn quicker, the twin screw gave you no advantage.

Captain SYMONDS: I am quite aware that short ships with long heels and large screws, and proportioned to effect quick turning, have described a circle more speedily than long, narrow ships, with twin screws. But making all conditions the same, you will find, I believe, that the twin screws will turn a ship as quick, or quicker, than any other means. The great saving, however, is that of space. A twin screw ship will turn in her own length with a degree of certainty *both ways*, a property which no other ship possesses. I do not think that the great advantage for war purposes is that of turning the whole way round, but of *half* turning. As to the rolling and weights, I am very glad to hear so high an authority as Admiral Paris on that point. It is a point, as Captain Selwyn said, which has been determined by experiments with models and in other ways many years back. I have always believed that weights on the broadside would, supposing the bottom to be in the proper form, reduce the rolling; at all events, as I said in my paper, make it easier, and therefore better, for fighting guns than would be the case with central weights. I have observed in every case of the central weight, whether in the keel or the deck of a small vessel more particularly, that there was a quick motion, a roll to windward very often under canvas—there was a constant quick jerking roll that would destroy any aim. This was not the case when the ballast or weights were properly distributed. With reference to Captain Craufurd's remarks on the "Monitor," I do not for an instant contend that that class of ships could not cross the seas, but they are not sea-going ships. I mentioned that we had had two instances of their doing so. It is no doubt satisfactory to hear that they have done it so well as his informants mention; but it is very extraordinary to find that officers who have been in the same "Monitor" give such very different accounts of her performances. That is a difficulty referred to in my paper. There is no reliance to be placed on the accounts you hear. One man says they are admirable sea boats; another, that they are always under water; a third says that he can hardly breathe between decks, and that the engines which do the work of ventilation sometimes break down, and the men are very nearly stifled. Another man tells you he has much purer air than on deck, and thinks it is a most agreeable thing to be in a constant draught. It is a sort of thing I cannot quite understand, but at the same time I am much obliged to Captain Craufurd for making those remarks.

Captain CRAUFURD: I examined the ship, and the statements appeared to be borne out.

Captain SYMONDS: I apprehend that I am not wrong in understanding that you *heard* these statements, but that you had no experience on board her.

Captain CRAUFURD: No; I had not.

Captain SYMONDS: With respect to Captain Fremantle's remarks, I may state that I read a list of ships, embracing most of the principal iron-clads in the Navy, all of which had fore and aft guns, many of them on that principle, but those guns were on the upper deck only, and were much further forward than in this diagram. This ship represents a smaller class of ship than the "Northumberland" or "Minotaur." The "Minotaur" has guns as far forward as this (pointing), with the same sort of indent, only far shorter.

Captain FREMANTLE: Firing on the line of the keel?

Captain SYMONDS: Yes, I speak under correction, but I believe, in fact, that their fire will absolutely converge. I have never heard of it, nor do I believe that there is the slightest difficulty in firing the guns when the vessel is heeling, any more than when she is upright. We must remember this—that we are not in the same position with regard to guns and carriages *now*, that we were ten years ago. It is one thing seeing an old 68-pounder slip about a ship's deck, like an egg rolling on a table, and another to see one of those magnificent gun carriages now in use, that can be worked in the most admirable manner quite as easily as you can move a locomo-

tive on a turn-table. If 600-pounders are introduced into the broadside system, we shall find that they may be controlled in the most perfect manner. Therefore, I consider that you have no need to be under any apprehension as to the working of the gun in training at a moderate inclination or rolling. I would go as far as 15 or 20 degrees. I think I have answered your question on that point, and also on the practicability of having this indent on the main deck, as well as the upper deck. We have no ship in the service where it is upon both decks, but we have one where it is upon the main deck, which is the most difficult point.

Captain FREMANTLE: Can the guns of the "Pallas" fire along the line of the keel?

Captain SYMONDS: At 14 degrees. I stated she was a converted wooden ship, and therefore it was not possible, under those circumstances, to give her the right-ahead fire without pulling her to pieces. In this ship (Fig. 3), which is a ship to be built for Her Majesty's Government, there is the line ahead fire on the upper deck, with a long indent, very much longer than we see here. Again, the possibility of fighting these guns on the main deck was shown in the "Bolivar," as I have mentioned. She had 70-pounders only seven feet six from the water. It was very heavy weather, and I am assured by her captain and officers that she never shipped a drop of water, that the guns were cast loose, and fired with the greatest possible ease; and I think you must remember that one great argument for the turret system was that the gun could be fired fore and aft when the ship was rolling, which could not be done on the broadside.

Captain FREMANTLE: If the gun were amidships you would not feel the roll so much.

Captain SYMONDS: I do not see the difference at all. The point was this. Some gentlemen who are supporting the turret principle contended that they could turn the gun fore and aft, and load with much more ease than on the broadside. Now, these guns are in precisely the same position. I am extremely obliged to you, gentlemen, for bringing forward for discussion any points in this paper, and I have to thank you very much for having listened so patiently to a very long lecture. I only wish you had been rather more severe in your criticisms, but I hope on a future occasion, when I am better able, to give you something more to the purpose than I have done now.

Sir FREDERICK NICOLSON: Before the meeting breaks up there is one duty we have to perform, which, I presume, you will all agree with me in, and that is to thank the lecturer for the paper which he has placed before us. It is a matter of great regret that Captain Coles is not here. He is not only an ingenious inventor, but also an able advocate, and so readily meets all the points brought against his system, that it is a matter of great regret he is not here to-night. But I am happy to be able to announce that he has applied to the Council for another day. I do not know what the title of his paper is to be, but if I remember rightly, it was said in his letter to be "What a turret ship ought to be;" so that if he is able to prepare that paper, I think there will be an excellent opportunity for again discussing whether it is possible to make a real sea-going turret-ship; for after all, these "Monitors" we have heard of, are not, in the fullest acceptation of the term, real sea-going cruizing ships.

LECTURE.

Friday, May 17th, 1867.

MAJOR-GENERAL SIR FREDERICK ABBOTT, Kt., C.B., Member of the Council of Education, in the Chair.

MILITARY LAW.

By Captain G. FREDERIC BLAKE, Royal Marines, and Student of the Middle Temple.

BY the kind permission of the Council of this Institution I am allowed to address you on the subject of military law. It is a subject to which of late I have had to pay close attention, and for which I have had special opportunities. I have ventured to hope that, from such incidental advantages, I might be able to collect and bring before you some observations relevant to military law which might not be altogether uninteresting to those who honour me to-day with their presence and attention. The more I have considered the subject, the more I have seen its importance and extent, and consequently the more I have felt my own incapacity to do it justice. I do not attempt, therefore, to offer you anything in the shape of a regular essay on military law; much less do I presume to advance crude opinions of my own as to its merits or demerits. I will strive to get through my task with as few legal and military technicalities as possible, and not weary you with the abstruse, recondite learning of others, or tiresome avowals of, and apologies for, my own inability and inexperience. What I have to ask you to listen to is, first, a faint outline of some of the usages and penalties of a martial kind in former days among the two great nations of antiquity from whom our laws as well as our literature take their richest source; then briefly to glance at those particulars as they appear in the earlier days of English history, and afterwards to come down to our own times, casting a side glance at military legislation as now existing among our continental neighbours and our transatlantic cousins.

Before touching on our military law, I would just glance at the practices and rules laid down in former times by other great nations

for maintaining discipline among their forces. It would be very interesting to follow the course of law as applied to soldiers distinct from that as applied to citizens through all countries and peoples from the earliest times, but of course that cannot be done on this occasion. I will merely ask you to turn with me to the two great nations of antiquity, the Greeks and the Romans, who each in their turn swayed the sceptre of power in the civilized world.

Greeks.—During the first ages of Greece, the unsettled state of society led to a general acquiring of the art of arms for the purpose of predatory inroad or self-defence. Perhaps the earliest notices of the Greek armies are in the Homeric poems. In the heroic ages, authority and obedience were regulated more by the nature of the circumstances, by the relative personal distinction of the chieftain, than by any set law of military discipline. With the Spartans, every free man became a soldier. When all of a family were not wanted for an expedition, those who were, seemed to have been chosen by lot. After the heroic age, a great impulse was given to military art by the conquests of the Thessalians and Dorians; the latter, in particular, reduced it to a system. The code of Lycurgus was a complete military one, and the discipline was of the strictest kind. The Athenians were less exact than the Spartans. They had ten officers called Strategi, one of whom went with an army, and presided at a species of court-martial, which consisted of members who had served with the offender. The military law of Athens prescribed the punishment of death for the crime of desertion while on service, though occasionally a fine or imprisonment was inflicted instead. An Athenian soldier considering himself unjustly treated, at the end of the campaign could compel his Officer to answer for his conduct before a tribunal of his countrymen. Agamemnon, in the Iliad, threatens with death those who may desert. Alexander the Great executed without a trial, thirteen Macedonians who had mutinied. Among the Lacedæmonians, cowards or deserters were either put to death or publicly disgraced. Military offenders, when at home, were made to wear a party-coloured dress, and were compelled to submit to any insult the meanest citizen chose to offer. Disgrace fell upon a soldier if he lost his shield in action.

Romans.—In the early ages of the kingdom and the commonwealth, every citizen became a soldier, and was at all times liable to serve. There were frequent calls for service. Protracted service became inevitable during the Carthaginian invasion, and when the dominion of Rome extended over Greece and Asia; but to the end of the Republic, the principle was recognised, that when a campaign was concluded, the soldier might return home and resume the occupations of a peaceful citizen. The practice introduced on a large scale of granting donations of land as pensions for long service, led to the creation of a numerous class disposed to devote themselves permanently to a military life. Augustus, with the advice of Mecænas, established a powerful standing army, each soldier of which took an oath to obey orders. The Romans punished military offences with extreme severity, soldiers guilty of the gravest offences being beheaded or crucified. Under the Pagan Emperors, some were burnt alive, or exposed to wild beasts. On the

occasion of a mutiny, every tenth man, chosen by lot, was punished. Deserters, after being scourged, were frequently sold for slaves. Occasionally the offender was made to bare his right arm, and was bled nearly to death. Centurions sat as judges of various military offences, and had the power of inflicting corporal punishment, whence their badge of office was a vine sapling (Smith's *Antiquities*).

Coming to our own country, allow me to read a short extract from Hallam's *Middle Ages* bearing on my subject:—

"In public national history I am aware of no instance of what may "be called a regular army more ancient than the body guards, or "huscarles, of Canute the Great. These select troops amounted to "6,000 men, on whom he probably relied to assure the subjection of "England. A code of Martial Law compiled for their regulation is "extant in substance; and they are reputed to have displayed a mili-"tary spirit of mutual union, of which their master stood in awe.

"NOTE.—*Singular Story.*—Canute having killed one of their body in "a fit of anger, it was debated whether the King should incur the "legal penalty of death, and this was only compromised by his kneel-"ing on a cushion before the assembly, and awaiting their permission "to rise."

It appears that among the Anglo-Saxons every freeman bore arms, and was trained to their use. I have not been able to discover any laws bearing upon their condition as soldiers, apart from that of citizens. At the Conquest the feudal system, which was altogether a military one, was fully established. It gave the Sovereign most despotic power over his vassals, and he had power to compel their military attendance and service, under the penalty for disobedience of a forfeiture of their lands. Even after the passing of Magna Charta, we find that every possessor of a knight's fief (and there were some 60,000 of them) had to furnish a soldier to attend the King in his wars for 40 days in every year, and to pay their expenses. Though the feudal system was not abolished till the Restoration, we find that paid bodies of troops were raised for special services. The early Kings employed them in their invasions of Scotland and in their French wars. Grose's book of *Military Antiquities* contains a collection of ordinances relating to the discipline of the English forces. I will not weary you by reading many of them, but merely quote a very curious one, showing the severity of the punishment resorted to in early days:—

— Charter of Richard 1st, 1189 (Rymer). "Richard by the grace "of God King of England, Duke of Normandy, &c. To all his men "going by sea to Jerusalem, greeting,—Know ye that by the common "council of all good men, we have made the underwritten ordonnance: "—He who kills a man on shipboard shall be bound to the dead man, "and thrown into the sea; if the man is killed on shore, the slayer "shall be bound to the dead body, and buried with it. Any one con-"victed by lawful witness of having drawn his knife to strike another, "or shall have drawn blood of him, to lose his hand. If he shall have "only struck with the palm of the hand, without drawing blood, he "shall be thrice ducked in the sea. Anyone who shall reproach a "man, or curse his companion, shall, for every time he is convicted

" thereof, give him so many ounces of silver. Any one convicted of " theft shall be shorn like a champion;* boiling pitch shall be poured " on his head, and down or feathers shaken over it, that he may be " known; and he shall be set on shore at the first land at which the " ship touches.

" Witness myself at Chinon."

From Grose, too, we gather that in the early period of our history the administration of military justice was chiefly directed by two important officials, the High Constable and the Marshal. They presided at tribunals formed of both civilians and officers, and not only tried and punished military offences, but also settled all kinds of suits between the followers of an army. In these early days we find military delinquents sometimes tried before Parliament. Henry de Essex, standard bearer to Henry II., was, for cowardice, deprived of his lands, and shorn and shut up for life as a monk, in the Abbey of Reading. In the first Parliament of Richard II., William de Weston and the Lord of Gomery were tried for delivering up the Castle of Arden, and sentenced, the former to be drawn and hanged, the latter to be beheaded.

The martial law for the time being, was declared in the Rules and Ordonnances of War, which were either made by the King, with the advice of his peers, for the expedition then on foot, as was that of Richard I., which I have read to you, and that of Henry V., or enacted by the Commander-in-Chief, who had authority given him by Commission from the King. Shakspeare puts expressions into Henry V's mouth, which show how strict was the discipline in his army. Fluellin has told the King that one Bardolph is like to be hanged for robbing a church. The King replies, " We would have all " such offenders so cut off; and we give express charge in our marches " through the country, there be nothing compelled from the villages, " nothing taken but paid for; none of the French upbraided, or abused " in disdainful language, for when lenity and cruelty play for a kingdom, " the gentler gamester is the soonest winner." Rymer mentions many commissions for executing military law even so recently as the time of James I. That King appointed Sir H. Vere, Captain General of the Army intended to be sent to the Palatinate, and in his Commission he is authorized to make and proclaim ordonnances of war for the government of the Army, and to enforce the execution thereof, and to hear, determine, and punish by himself or deputies, all criminal causes, mutinies, and desertions, and all other crimes whatsoever, and to punish by death, loss of member, or other corporal infliction, according to their crimes, and the laws and customs of war; and also to hear and determine in like manner all civil causes, contracts, &c., arising in the said army. Also in like manner to judge all persons that may in future join the Army. A similar commission was granted by Charles I. to the Earl of Arundel, to be Captain-General of the Army employed at home, in which he was authorised to appoint a Provost-Marshal to execute the martial law. In the reign of Henry VIII., the office of

* Champions, hired to fight legal duels in cases of murder or homicide, had their hair shorn.

High Constable ceased, and the High Marshal afterwards executed his military judicial functions. In the ordonnance of this reign we find—"Item,—the High Marshal must hold two Court days in the week, "that is to wit, on Monday and Thursday, for them that have any "matters in Court, with his officers with him, as it is ordained by the "Chief Captain." Gradually the powers executed under the commission granted to the Commanders-in-Chief, lessened the independence of the Marshal's Court, and soon we have courts or councils of war, which sat at stated times, or as ordered by the Commander-in-Chief, and at which officers of a certain rank (apparently not under that of a Colonel) were entitled to sit as assessors or members; and instead of a Marshal, we hear of an officer styled President of the High Court of War, who on certain occasions claimed the privilege of a double vote. Sir Francis Vere, in his description of the duties of the several officers of a regiment, mentions it as the duty of all colonels once every week to call together all his captains, and to inquire into all offences in his regiment; to examine the nature and quality of such offences; to prepare the causes for a more speedy hearing, and to repair to the court-martial as often as they shall be warned. The following extract is taken from a work entitled, "*A Brief Treatise of Warr*, &c., by W. T., in the year "of our redemption, 1649." (MS. No. 6,008, Harl.)

"The next in order I conceive to be the President of the High "Court of War, whose place requireth him to be a person of honour "and integritie, of sound judgment, of ripe knowledge in civil and "military laws, before whom all matters civil and criminal that have "relation to the Army are to be tryed, therefore he ought to be "assisted with a learned fiscal or judge advocate, as also with a well-"experienced auditor, to audit and keep a register of all cases and "matters that shall be brought before the Court of War. His office "is to assemble the Court of War as often as the General shall please "for to appoint him; and in the interim he is to prepare all business "and causes, so that the Court of War may have a clear and just "information of all things; and when that any business shall come into "a final sentence, he shall have the privilege of a double voice, because "he represents the General's person."

Towards the latter end of the reign of King James I, and in the beginning of that of Charles I, a kind of mixed court seems to have been occasionally adopted, composed of both civil and military members. Such as when an army was quartered at Portsmouth, Plymouth or Dover, or other sea-ports, waiting to be embarked for foreign service; in which case a Commission was sent down appointing Commissioners to try all offences committed by the soldiers or followers of the Army within certain counties or districts. Many of the Commissioners were military men, but with them were joined the Earl Marshal, Lord Lieutenant of the county, and the mayors, or chief magistrates of the principal towns of that district and its environs. Rymer mentions several instances about the years 1626 to 1640. In the laws and ordonnances of war, published A.D. 1640, by the Earl of Northumberland for the King's Forces, and those of the Earl of Essex for the Parliamentary forces in 1643, all controversies between soldiers and their captains and others, were

directed to be summarily heard and determined by the Council of War, except the weightiness of the cause required public deliberation. No other court is mentioned.

The Rules and Articles of War in the reign of James II, approach those which are now in force, some of them forming the basis of our present laws. The following directions with regard to military discipline were issued for the use of His Majesty's Forces in 1686:—

Of Councils of War, or Courts-Martial.

"In an Army the Council of War had always to meet at the Gene-
"ral's quarters or tent, and none were to be called to it but Lieutenant-
"Generals, Major-Generals, and Brigadiers. The attendance of
"Colonels and Commanders was only allowed when the matters con-
"cerned their regiments. Private Councils of War or Courts Martial
"in a garrison were held at the Governor's house; when in a camp, at
"the Colonel's tent, and he notified to the Captains to be present. The
"Governor or Colonel, or whoever was to be President, took his place
"at the head of the table, and the Captains were ranged in order
"according to seniority. The town Mayor or the Quarter-master of
"the regiment, who, in the absence of the Judge Advocate, discharged
"his office, sat at the lower end of the table. First Lieutenants and
"Ensigns had a right to be in the room, but had to stand at the Cap-
"tains' backs with their hats off, and had no vote. The Council having
"been called to deliberate on some matter of importance, the President
"opened it to the Court, when the opinions of the members were
"taken in writing,—those of the youngest officers first. The result
"was decided according to plurality of votes. If the Council of War
"were held to judge a criminal, the President and Captains having
"taken their places, the prisoner having been brought before them, and
"the information read, the President interrogated the prisoner about
"all the facts whereof he was accused. After the Court had heard
"his defence, and the proofs made or alleged against him, he was
"ordered to withdraw, and was remitted to the care of the marshal or
"jailor. The sentence was decided by the plurality of votes; after
"which the criminal was brought in and the decision announced in the
"name of the Council of War, or Court Martial. When the criminal
"was condemned to any punishment, the Provost-Marshal caused the
"sentence to be put in execution, and if the punishment were to be
"public, the regiment was drawn together to see it, that the other
"soldiers might thereby be deterred from offending. Before a soldier
"was punished for any infamous crime, he was publicly degraded from
"his arms, and his coat stripped over his ears. A Council of War or
"Court Martial was to consist of seven members at least, and, if there
"were not Captains enough, inferior officers might be called in.

"By 2nd and 3rd Edward VI, c. 2, it was enacted that martial law
"might be declared by every field officer in every field under his charge
"once a month, and by every Governor or Captain of a garrison or
"fortress once every quarter, within his charge. The 5th Philip and

" Mary, c. 3, established trial by jury for military offenders, unless the " offence was committed during actual service, in which case the Lord " Lieutenant or Lord Warden, or any other chieftain might determine " the punishment, according to his own discretion. The judicature of " the Constable's Court gradually underwent a change. Its power was " exercised through the medium of Parliament, and sometimes, even, " by the civil magistrates."

I now wish to call your attention to some of the peculiar punishments in vogue in those days. Few of the ordonnances of war mention the punishment of death by beheading or hanging. In cases where a large body of troops had been guilty of one common crime, and decimation was resorted to, billets were put into a helmet, every tenth one being marked "D," and those who drew the marked billets suffered the punishment of death. Occasionally the sufferers were chosen by means of casting dice on the drum-head. When an officer had been guilty of blasphemy, his tongue was bored with a red-hot iron. This practice remained in force till the time of Queen Anne. Another punishment sometimes inflicted, was that of riding the wooden horse. This machine consisted of planks nailed together so as to form a sharp ridge or angle, about 8 feet 9 inches in length. It was supported by four posts, about 6 feet 7 inches in height, and was placed on a moveable stand. The punishment of picketing was carried out thus:—A big post was driven into the ground, and the delinquent was ordered to mount a stool near it. His right hand was then fastened to a ring in the post by a noose round his wrist, and drawn up as high as he could stretch. A stump, the height of the stool, with its end cut to a round and blunt point, was then driven into the ground near the post, and the stool being taken away, the sufferer had nothing but this stump to rest on. This severe torture was sometimes continued for upwards of a quarter of an hour. The punishment of flogging was inflicted with switches, and not as in the present day. We have an account of the following punishment being inflicted on an officer after the battle of Falkirk, in the rebellion of 1745. The line were drawn out under arms, the prisoner was brought to the head of the oldest brigade, his sentence was read, his commission was cancelled, his sword was broken over his head, his sash was cut in pieces and thrown into his face; and, lastly, the Provost-Marshal's servant gave him a kick and turned him out of the line. When a private soldier was dismissed, he was drummed out with a halter about his neck.

Still another punishment was that of the whirligig, a kind of wooden cage turning on a pivot, into which the delinquent was placed, and then whirled round with amazing velocity.

The immediate cause of the passing of the first Mutiny Act was as follows:—

The Scottish regiment of Dumbarton when ordered to Holland to replace a Dutch regiment which William desired to keep in England, mutinied at Ipswich, and declared their adherence to the abdicated prince. The King communicated with his Parliament and marched three Dutch regiments against the disaffected troops. The Parliament,

in order to repress the mutinous spirit of the Army, passed a Mutiny Act, a warrant of unquestioned legality for the punishment of all military feuds. The first regular Mutiny Act was passed the 3rd of April, 1689, and was intended to be in force six months, but excepting during three years of the reign of William it has been annually renewed ever since. It will thus be seen that Military Law executed by the Sovereign is authorized by Parliamentary legislation, and rests upon a basis of undisputed legality. Whitelocke, speaking of the first Mutiny Act quaintly says, "though the King would have the power of the "sword, the Parliament would have that of the purse; so that "they must both agree to draw the sword, or else leave it in the "scabbard, which is the best place for it." Hallam in his *Constitutional History of England*, says, "These are the two effectual securities "against military power; that no pay can be issued to the troops with-"out the previous authorization by the Commons in a Committee of "Supply, and by both Houses in an Act of Appropriation; and that "no officer or soldier can be punished for disobedience, nor any "Court-Martial held without the annual re-enactment of the Mutiny Bill."

I will now turn to our Military Law as it is at present constituted. The definition of Municipal Law is equally applicable to Military Law, it is "a rule of conduct prescribed by the supreme power in a state, "commanding what is right, and prohibiting what is wrong." As also the common law is composed of two elements, the written and unwritten law, so the law military has its written element in the Mutiny Act and Articles of War, and its unwritten part in the usages and customs of the service.

Tytler in his *Essay on Military Law*, says, "The modern British "soldier enjoying in common with his fellow-subjects, every benefit "of the laws of his country, is bound by the military code solely to "the observance of the peculiar duties of his profession, a code which "is simple in itself, reasonable in its enactments, easy in all its obliga-"tions, level to the meanest understanding, and more effectually "promulgated and better known than any of the ordinary statutory "laws of the realm."

I had the privilege of hearing the charge of the Lord Chief Justice Cockburn (the very highest authority in the common law), to the grand jury, in the case of the Queen v. Colonel Nelson and Lieutenant Brand. Unhappily it has not been published, but I made notes of it, and can vouch for the substance of his expression. He said that the Mutiny Act and the Articles of War are so elaborate and precise, that it is impossible for any one who looks into them with the view of ascertaining what his duty is, to fail in discovering it, or in finding out what the law is by which he is to be guided. There is nothing arbitrary in the military law, it is precise, specific, and defined.

We will now take the side glance I mentioned in my opening observations, at the various modern systems of military law in other countries, in France, Austria, Prussia, and the United States.

France.

Conseils de Guerre, are composed of seven judges, assisted by
A Commissarie Imperial,
A Rapporteur,
A Greffier.

From the rank of private to that of captain, the composition of the court is:

1 Colonel—President.
1 Chef de Bataillon ou d'escadron.
2 Capitaines.
1 Lieutenant.
1 Sous-lieutenant.
1 Sous-officier.

The following is a brief sketch of the mode of procedure in a French Military Court. The complaint is drawn out by the captain, and the attendance of witnesses secured. This is sent to the *Chef de bataillon*, who forwards it to the Colonel, the Colonel sends it to the Lieutenant-General, the General to the Conseil de Guerre. When the court is held the Commissaire de l'Empereur attends to see that the proceedings are conducted according to law, and when required, to read the text of the law applicable to the case. The prisoner is interrogated by the rapporteur, who has to prepare all the proceedings and enlighten the council in the performance of their sacred duty. A member of the bar may be appointed to defend the prisoner, and the verdict is decided by a majority of at least five out of seven.

Punishments are very severe, but no flogging is allowed.

In Austria each regiment has its regimental Auditor, who must have passed an examination, and taken a degree of doctor of law. He ranks with and wears the uniform of a captain. His duty is to examine into all cases of prisoners sent for trial, to sift and prepare the evidence, and exclude all irrelevant matter. When the court assembles, he explains the nature of the case, the laws affecting it, and the particular points to be decided. He is expected to keep before the consideration of the court all the points which bear in favour of the prisoner. In fact, he has to transact all the business of a legal kind which may affect the regiment, and to keep historical records of these transactions. There are two kinds of courts martial, a full court for grave offences, and a lesser court. The former consists of two officers of each rank from princes to captains. The Field Officer presides, and the court has the power of life and death. In the latter court the members consist of one of each rank, from that of the man to be tried up to the captain who presides.

A Prussian court martial consists of a captain, who presides, two first lieutenants, two second lieutenants, two sergeants, two corporals, two acting corporals, and two privates. The witnesses are examined

by an officer called an examining officer. When the prisoner is a sergeant, the acting corporals and privates are not admitted, and when he is a sergeant-major, corporals are also excluded.

In Prussia there are seventeen schools for military education, in which special attention is given to military legislation.

The United States.—The Articles of War and procedure of courts martial are very similar to our own in the United States. With their courts a Deputy-Judge Advocate is still the prosecutor. No flogging is allowed.

I will now venture to bring before you the outline of a scheme which, if carried out, I cannot but think would tend to the gradual removal of those defects which exist in our mode of procedure in courts martial, and would raise the whole tone of our military legislation. I have much distrust of myself as the medium of bringing my thoughts before you, but I have a conviction of the necessity for their application to the present state of things. The plan I would humbly venture to throw out as a suggestion, is that it would be in the interest of the Service, for the Government to announce their intention of forming a body of Officers possessing the necessary qualifications for the confident performance of the duties now required of the Deputy-Judge Advocate, and such other legal duties as the Service might require.

Candidates for this body should be officers of ten years' standing, or who have passed the Staff College. They should be examined in the Mutiny Act, the Articles of War, Procedure of Courts Martial, the usages and customs of the Service, and in the knowledge of military law, which they would acquire while doing duty with their regiments. A certain number should be selected and exempted from military duties for one year to attend classes connected with the Inns of Court on such subjects as Common Law, Constitutional History, and International Law. They should attend the Criminal Courts and study the rules of evidence, the formation of judgments, and the manner of conducting judicial investigations. At the end of a year these officers should undergo an examination, and, if found qualified, should be employed as Deputy-Judge Advocates, or, until they obtained such appointment, as Prosecutors at General Courts Martial. In course of time they might be required to assist at Garrison as well as General Courts Martial. No doubt the Council of Legal Education would meet the military authorities, and grant facilities for these students, such as not requiring them regularly to join the Inns of Court. They should have access to the records in the Judge Advocate's office.

In common with all readers of military history, I have profound respect and admiration for Sir C. Napier. Major Hughes, in his book on the duties of Judge Advocate, quotes Sir C. Napier, as giving this recommendation, "That no man should be appointed, either to officiate, "or be permanently posted to the Judge Advocate-General's Depart-"ment, till after a certain length of service as a Regimental Officer. "That previously to his entering on his duties, a Judge Advocate "should undergo a strict examination as to his knowledge of military "and criminal law, and the practice of military courts."

Major Hughes, D. J. A., also writes:—"I do most decidedly assert "after some little experience in the department, and not without "giving the subject the deepest consideration, that the duties of Judge "Advocates in the present day require qualifications and attainments "which are not to be obtained without instruction and a regular course "of study, to which must be added, if proficiency is an object, assi- "duity and research."

I do not claim any exclusive originality in this idea. I suppose most military men who have thought much on the procedure of our Courts Martial, have seen that there is room for improvement in it, and they would rather look to members of their own profession for this improvement than seek it from the bar, while on the other hand most of the legal writers on our military law have suggested that lawyers should either preside or act as assessors to military courts, as the means of perfecting their procedure. I find that a military writer in the *Law Magazine* suggests a plan very similar to the above, though of course he does not write of my special scheme, of Officers keeping classes at the Inns of Court as a good means of qualifying themselves for their varied legal duties. The article is "On the real character of Courts Martial "and their proposed Reform." The author having argued strongly against courts martial being placed under civil control, in which I entirely agree with him, proceeds,—"Why not train a class of officers "to act, if not as chairmen of Courts Martial, at all events as asses- "sors?"

"The exclusive appointment, moreover, of military men to these "responsible positions, would be a great incentive for officers generally "to acquire a thorough knowledge of military law, and of the proper "mode of conducting judicial examinations."

I cannot but think, that if Officers of some standing were to give up their ordinary avocations for a year, and devote themselves to these studies, their doing so among regular law students, and under the instruction of the distinguished Readers of the Inns of Court, in fact, their breathing the legal atmosphere, would materially lessen their difficulties in acquiring that legal acumen which might be of important advantage to their Service. I have been long enough in the Service to know that, were such a scheme as I have suggested carried out, many, perhaps not ill-naturedly, would carp at men being taken from their regular duties for a time to qualify for good appointments; and they might say it was a good slope—a good way of getting a year in town. This sort of thing can be well refuted by looking at the prospectus of the classes, which the scheme suggests should be kept. The best part of every day in the week is occupied with the classes during the Term; and when the classes are not going on, attendance at the Criminal Courts, and the acquisition of the requisite knowledge, would abundantly occupy the time of these military law students. I take this opportunity, and I do so with much pleasure, of paying my humble, but hearty, tribute of praise and thanks to the legal profession, with whom I have now for some time been associated. Coming among them as I did a perfect stranger, having all my life followed such entirely different pursuits, I have found nothing but kindly courtesy

and willing help, not only from the students with whom I have necessarily been most associated, but from the Bar, the Readers, and even the Benchers and Masters of the Temple. Officers keeping these law classes and acquiring thereby a sort of legal acumen, would not imperil their efficiency as Officers and soldiers. On the contrary, the skill which they would acquire in investigating facts brought before them would be of use in strategic arrangements, and help to prompt decision in tactics before an enemy. Were this body of Officers formed, in course of time every garrison and colony would have at least one of them. I cannot but believe, that on occasions of difficulty or disturbance arising, it would be a great satisfaction to Governors of Colonies or Generals in command, to know that they had an Officer who had made law his especial study, and whose counsel might be relied on, and in any peculiar emergency, might be felt more desirable than that of the ordinary law advisers; not that I would suggest that these Officers should be wholly responsible Officers, but that from their having successfully carried out a course of legal study, they would be qualified to give to their chiefs a valuable opinion. Newspapers have of late frequently made severe criticisms on our Military Courts, and their mode of procedure. Those remarks have often been characterised by powerful writing, and by considerable ignorance of the subject they maligned. Still, in these days, when papers are so much read by the public, and so much in the hands of our soldiers in their recreation and reading rooms, it would be well to obviate these censures on our military legislation, and to endeavour to raise its tone by forming such a body of Officers as I have suggested. I said in my opening remarks that I would not presume to put forward my own opinions as to the merits or demerits of military law, nor will I. I will only say that the mere establishment of such a body of Officers would in itself lead to the introduction of such improvements or alterations as may be needed in our military law and its administration. I know many will say that the present system does well enough, and that at the Staff College there is a special class for military legislation. Every one must have the highest respect for the varied attainments of those Officers who have passed through the Staff College; but for the very reason that their studies are so varied, I maintain that sufficient special attention cannot be given during the course at the College to the qualifying of an Officer for the confident discharge of the manifold duties of a Judge Advocate. I lately met with a story of a traveller who came to a well, and noticed a maiden weeping beside it. On his inquiring what was the cause of her grief, she replied that she wept because she was thinking she might get married and have children, and one of them might fall into this well. Is there not too much of this anticipation of improbable evils? It may be dreaded, that if this scheme were carried out, the "law's delays," with legal quibbles and technicalities, would creep into our Courts Martial. Is it not better to see that the Service would gain Officers who had exercised judgment in disrobing facts of appearances which do not belong to them, and in dissevering them from others with which

they have no essential connection; and so, often might be prevented that most deplorable of all the consequences of human fallibility, viz., the condemnation and punishment of the innocent, and, next to it, the suffering the guilty to escape conviction. I have to thank the Council for permitting me to address you, and I hope they may extend their kindness by permitting some portions of what I have put forward to appear in our Journal, that perhaps its wide dissemination may bring these imperfect suggestions to the notice of those who, from their knowledge and position, may improve on them and promote their adoption.

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